



Libby Asbestos Site

Libby, Montana

*Operable Unit 1 –
Former Export Plant Site*

August 3, 2009

A large background photograph showing a wide river with a rocky shoreline in the foreground. In the distance, there are steep, forested mountains under a clear blue sky. A smaller inset photograph at the bottom shows a gravel road leading to a building with several white garage doors, situated near a body of water and a forested hill.

**Final Remedial
Investigation Report**

**Final
Remedial Investigation Report
Operable Unit 1 - Former Export Plant Site
Libby Asbestos Superfund Site
Libby, Montana**

August 3, 2009

**Contract No. DTRT57-05-D-30109
Task Order No. 00015**

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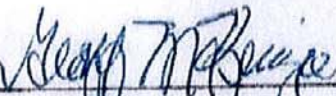


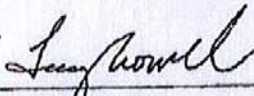
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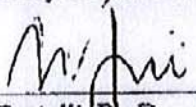
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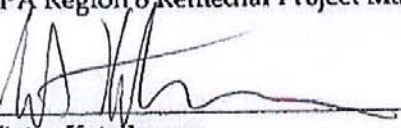
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Abbreviations and Acronyms

ABS	activity-based sampling
ASHERA	Asbestos Hazard Emergency Response Act of 1986
ARARs	Applicable or Relevant and Appropriate Requirements
ATSDR	Agency for Toxic Substances and Disease Registry
BNSF	Burlington Northern and Santa Fe Railroad
bgs	below ground surface
CDC	Center for Disease Control
CE	cumulative exposure
cm ²	square centimeters
CSF	close support facility
CSM	conceptual site model
CTE	central tendency exposure
DEQ	Montana Department of Environmental Quality
DQOs	data quality objectives
EPC	exposure point concentration
EF	exposure frequency
ET	exposure time
f/cc	fibers per cubic centimeter
FS	feasibility study
Grace	W.R. Grace Company
Grav	gravimetric
IUR	inhalation unit risk
HQ	hazard quotient
IARC	International Agency for Research on Cancer
ISO	International Organization for Standardization
LA	Libby amphibole
Libby Site	Libby Asbestos Superfund Site
m ³	cubic meters
MDT	Montana Department of Transportation
Millwork West	Millwork West Company
ND	non-detect
NIOSH	National Institute for Occupational Safety and Health
NMRD	non-malignant respiratory disease
NAS	National Academy of Sciences
NTP	National Toxicology Program
OU1	operable unit 1
PCM	phase contrast microscopy
PCME	PCM-equivalent
PLM	polarized light microscopy
PLM-9002	NIOSH Method 9002
PM	particulate matter
QA	quality assurance
QA/QC	quality assurance/quality control
QC	quality control

RfC	reference concentration
RI	remedial investigation
RME	reasonable maximum exposure
s/cc	structures per cubic centimeter
s/cc-yrs	structures per cubic centimeter per year
s/cm ²	structures per square centimeter
SAP	sampling and analysis plan
site	former Export Plant and all other areas contained within OU1
SQAPP	sampling and quality assurance project plan
TEM	transmission electron microscopy
TWF	time weighting factor
TR	trace
UAO	Unilateral Administrative Order
USGS	United States Geological Survey
VE	visual estimation
WHO	World Health Organization
XRD	x-ray diffraction
yd ³	cubic yards
%	percent
≥	greater than or equal to
<	less than
°F	degrees Fahrenheit
μm	micron
95UCL	95% upper confidence limit

Section 1

Introduction

The purpose of this remedial investigation (RI) report is to present sufficient information to support a feasibility study (FS) and remedial action decisions for the former Export Plant Site (site), Operable Unit 1 (OU1) of the Libby Asbestos Superfund Site (Libby Site) in Libby, Montana.

This RI report includes a comprehensive description of the nature and extent of contamination and a description of past investigative and removal actions at the site, as well as the risk assessment, which presents estimates of the risks to human health posed by the contamination at the site. The subsequent FS report will use the information from the RI to perform a systematic analysis to determine the need for, and scope of, any required remedial action.

The main contaminant of concern at the site is asbestos. At the Libby Site, the form of asbestos that is present in the vermiculite deposit is an amphibole asbestos that for many years was classified as tremolite/actinolite (e.g., McDonald et al. 1986a, Amandus and Wheeler 1987). More recently, the United States Geological Survey (USGS) performed electron probe micro-analysis and x-ray diffraction analysis of 30 samples obtained from asbestos veins at the mine (Meeker et al. 2003). Using mineralogical naming rules recommended by Leake et al. (1997), the results indicate that the asbestos at Libby includes a number of related amphibole types. The most common forms are winchite and richterite, with lower levels of tremolite, actinolite, and magnesiorichterite. Because the mineralogical name changes that have occurred over the years do not alter the asbestos material that is present in Libby, and because Environmental Protection Agency (EPA) does not find that there are toxicological data to distinguish differences in toxicity among these different forms, EPA does not believe that it is important to attempt to distinguish among these various amphibole types. Therefore, EPA simply refers to the mixture as Libby amphibole (LA) asbestos.

Conceptual site models (CSMs) are used to identify potential site-specific exposure pathways to determine what pathways require evaluation during risk assessment and to ensure each pathway is properly assessed at the time of RI sample collection. The CSM for current and future receptors at OU1 indicate the potential contaminated media of concern for OU1 include: indoor air, dust in air of vehicles, outdoor air near disturbed soil, general (ambient) outdoor air, and dust in air from disturbances of roofing or other outdoor surfaces. Current potential human receptors at the site include rescue volunteers, fishing guides, park visitors, city maintenance workers, future commercial workers, and future construction workers. Additional discussion regarding the potential exposure pathways are discussed in Section 6.

During the investigations performed to determine LA exposure levels for the pathways of concern at OU1, LA was observed in all media sampled: indoor air and dust, outdoor ambient air, personal air, and soil. Risk evaluations indicate the only exposure pathway of concern is related to the potential future exposures to outdoor

air near disturbed soil. Exposures to LA from disturbance of outdoor soil could become higher in the future if no remedial actions are taken. Current site conditions are such that vermiculite is present in surface soil. Vermiculite and LA will continue to exist in surface soil at the site if no remedial actions are taken. The details regarding how these conclusions were reached are provided in this RI report.

1.1 Report Organization

This RI report is organized according to the format suggested in the *Guidance for Conducting Remedial Investigations and Feasibility Studies under the Comprehensive Environmental Response Compensation and Liability Act* (EPA 1988), and includes the following sections:

- **Section 1 - Introduction.** Provides the purpose and organization of the RI, a brief description of the site location and layout, and a summary of mining and regulatory activities conducted to date at the site.
- **Section 2 - Study Area Investigations and Removal Actions.** Provides an overview of site investigations and removal actions completed at the site.
- **Section 3 - Physical Characteristics.** Provides a description of the physical characteristics of the site. Includes discussion of climate, surface water, geology, groundwater, land use, and demographics.
- **Section 4 - Nature and Extent of Contamination.** Describes the nature and extent of LA contamination within the site.
- **Section 5 - Fate and Transport.** Describes how LA moves through the various media at the site. Includes contaminant release mechanisms, potential routes of migration, sources, and contaminant fate and persistence.
- **Section 6 - Risk Assessment.** Presents the human health risk assessment for the site.
- **Section 7 - Summary and Conclusions.** Summarizes the material in the previous sections and provides conclusions drawn from that work.
- **Section 8 - References.** Lists all the references used in the preparation of this RI report.

1.2 Site Background

Numerous hard rock mines have operated in the Libby area since the 1880s, but the dominant impact to human health and the environment in Libby has been from vermiculite mining and processing. Prospectors first located vermiculite deposits in the early 1900s on Rainy Creek northeast of Libby. Edward Alley, a local rancher, was also a prospector and explored the old gold mining tunnels and digs in the area. Reportedly, while exploring tunnels in the area, he stuck his miner's candle into the wall to chip away some ore samples. When he retrieved his candle, he noticed that the

vermiculite around the candle had expanded, or “popped,” and turned golden in color.

In 1919, Alley bought the Rainy Creek claims and started the vermiculite mining operation called the “Zonolite Company.” While others thought the material was useless, he experimented with it and discovered it had good insulating qualities. Over time, vermiculite became a product used in insulation, feed additives, fertilizer/soil amendments, construction materials, absorbents, and packing materials. Many people used vermiculite products for insulation in their houses in and around the Libby Site and soil additives in their gardens. In 1963, the W. R. Grace Company (Grace) bought the mine and associated processing facilities and operated them until 1990.

Operations at the mine included blast and drag-line mining and milling of the ore. Dry milling was done through 1985, and wet milling was done from 1985 until closure in 1990. After milling, concentrated ore was transported down Rainy Creek Road by truck to a screening facility (known today as the former Screening Plant) adjacent to Montana Highway 37 (Highway 37), at the confluence of Rainy Creek and the Kootenai River. Here the ore was size-sorted and transported by rail or truck to processing facilities in Libby and nationwide. At the processing plants, the ore was expanded or “exfoliated” by rapid heating, then exported to market via truck or rail. Historic maps show the location of the “Zonolite Company” processing operation at the edge of the lumber mill, near present day Libby City Hall. This older processing plant was taken off line and demolished sometime in the early 1950s. The other processing plant (known today as the former Export Plant – OU1 and the subject of this RI report), was located near downtown Libby near the Kootenai River and Highway 37. Expansion operations at the site ceased sometime prior to 1981, although existing site buildings were still used to bag and export milled ore until 1990.

After operations at the Export Plant ceased, various commercial and industrial business operated from the former plant location until Grace and EPA began removal activities in 2000.

Over the course of Grace’s operation in Libby, invoices indicate shipment of nearly 10 billion pounds of vermiculite from Libby to processing centers and other locations. Most of this was shipped and used within the United States. Nearly all of this material ended up in a variety of commercial products that were marketed and sold to millions of consumers.

1.2.1 OU1 Site Description

To facilitate a multi-phase approach to remediation of the Libby Site, seven separate OUs have been established. These OUs are shown on Figure 1-1 and include:

- OU1. The former Export Plant is defined geographically by the property boundary of the parcel of land that included the former Export Plant and is situated on the south side of the Kootenai River, just north of the downtown area of the City of Libby, Montana (Figure 1-2). The property is bounded by the Kootenai River on the north, Montana Highway 37 (forthwith referred to as Highway 37) on the east, the

BNSF railroad thoroughfare on the south, and State of Montana property on the west.

- OU2. OU2 includes areas impacted by contamination released from the former Screening Plant. These areas include the former Screening Plant, the Flyway property, the Highway 37 right-of-way adjacent to the former Screening Plant and/or Rainy Creek Road, and privately owned properties.
- OU3. The mine OU includes the former vermiculite mine and the geographic area (including ponds) surrounding the former vermiculite mine that has been impacted by releases from the mine, including Rainy Creek and the Kootenai River. Rainy Creek Road is also included in OU3. The geographic area of OU3 is based primarily upon the extent of contamination associated with releases from the former vermiculite mine.
- OU4. OU4 is defined as residential, commercial, industrial (not associated with former W.R. Grace Company [Grace] operations), and public properties, including schools and parks in and around the City of Libby, or those that have received material from the mine not associated with Grace operations.
- OU5. OU5 is defined geographically by the parcel of land that included the former Stimson Lumber Company. OU5 is bounded by the high bank of Libby Creek to the east, the Kootenai River to the north, and residential/commercial/industrial property within OU4 to the south and west. This OU is approximately 400 acres in size and is currently occupied by various vacant buildings as well as multiple operating businesses (lumber processing, log storage, excavation contractor, etc.). Within the boundary of OU5 exists the Libby Groundwater Superfund Site, which is not associated with the Libby Asbestos Superfund Site.
- OU6. Owned and operated by the Burlington Northern and Santa Fe Railroad (BNSF), OU6 is defined geographically by the BNSF property boundaries from the eastern boundary of OU4 to the western boundary of OU7 and extent of contamination associated with the rail yard.
- OU7. The Troy OU includes all residential, commercial, and public properties in and around the town of Troy, Montana, approximately 20 miles west of downtown Libby.

OU1 encompasses an area of approximately 17 acres and is situated on the south side of the Kootenai River, just north of the downtown area of the City of Libby, Montana (Figure 1-2). The property is bounded by the Kootenai River on the north, Highway 37 on the east, the BNSF railroad thoroughfare on the south, and State of Montana property on the west.

The site was historically owned and used by Grace for stockpiling, staging, and distributing vermiculite and vermiculite concentrate to vermiculite processing areas and insulation distributors outside of Libby. Because vermiculite mined from Libby has been found to be contaminated with LA, a known human health risk, EPA

initiated an emergency response action in November 1999 to address questions and concerns raised by citizens of Libby regarding possible ongoing exposures to asbestos fibers as a result of historical mining, processing, and exportation of asbestos-containing vermiculite. This report summarizes each of the investigation events and subsequent cleanups that have occurred at OU1 between 1999 and 2007. Information regarding quick response activities conducted by EPA in 2008 is also provided.

Based on current land use, the site on the west side of Highway 37 is divided into two distinct areas separated by City Service Road (also known as West Thomas Street): the area of the site to the south of City Service Road (approximately 12 acres) and a 4.7-acre recreational area known as Riverside Park to the north of City Service Road. For discussion purposes, these areas will be referred to throughout this report as Area 1 and Area 2, respectively. The Riverside Park boat ramps are part of Area 2. In addition, the embankments of Highway 37 on both sides of the highway, City Service Road, and Thomas Street are included as part of OU1 because of their immediate proximity to the site and the known presence of vermiculite in this area. These areas will be referred to throughout this report as Area 3. Figure 1-3 shows the delineation of these areas.

1.2.2 Historic Use

From the early 1960s to approximately 1990, the Export Plant was used by Grace for stockpiling and distributing vermiculite concentrate to Grace expansion plants and customers throughout the United States. Ownership was transferred to the City of Libby in the mid-1990s.

Throughout its history, portions of both Area 1 and 2 of the site have been leased to various parties for commercial and non-commercial enterprises. From approximately 1977 to 1997, organized youth baseball events (games and practices) were held at ball fields, which were centrally located in Area 1. Between approximately 1987 and 2000, the Millwork West Company, a retail lumberyard and building material supplier, leased the northwestern portion of Area 1. Buildings and equipment used by Millwork West were removed and/or demolished as part of the removal activities conducted by Grace in 2001 and 2002, as described in Section 2 of this report.

Other commercial and industrial uses of the site also occurred in the past that utilized infrastructure at the site. These other commercial/industrial uses reportedly included a metal scrap dealer and a larch tree gum manufacturer. The infrastructure that supported these businesses included industrial power supply, a railroad spur, and truck scales. This infrastructure was removed during the removal activities conducted at this site.

1.2.3 Current Use

Area 1 is currently owned by the City of Libby and is undeveloped, with the exception of a small area of the site currently used by David Thompson Search and Rescue. In 2004, the search and rescue organization constructed a building (see Figure 1-3) containing a main office and a five-bay garage on the northwest portion of the site on the south side of City Service Road. The garage is used for storing search

and rescue equipment and vehicles. Several other agencies, including local and state law enforcement, also hold meetings in the main office. Access to Area 1 has been restricted by construction fencing and EPA has provided guidance to the city regarding the use of caution when conducting any activities at the site that disturb soil.

Area 2, Riverside Park, is also currently owned by the city and serves a variety of recreational visitors. The main features of the park include two boat ramps, a pavilion, picnic tables, and a pumphouse. The newer of the two boat ramps is used by recreational boaters and commercial fishing outfitters; the older ramp is not commonly used due to swift current at its approach. The pumphouse (see Figure 1-3) houses a pump that draws non-potable water from the Kootenai River. The pump was installed jointly by the City of Libby and Lincoln County in 1999 to provide a backup water source to local fire departments. The pumphouse is accessed by city personnel in order to perform maintenance on the pump. The pump is connected to an external water spigot, which is used by the city to draw water for street sweeping and other maintenance operations, and other workers (such as employees of local fill pits and contractors working on EPA's removal program) to draw water primarily for use in dust suppression equipment. Access to Area 2 is unrestricted.

Area 3 is owned and maintained by the Montana Department of Transportation (MDT). MDT currently performs only periodic maintenance of these embankments as needed. The types of maintenance activities conducted by MDT include application of herbicides, replacement of guardrails and guardrail posts, and replacement and maintenance of roadside light posts. Access to these areas is unrestricted.

1.2.4 Future Use

Future use of Area 1 is unknown at this time. The city expects that David Thompson Search and Rescue will continue to utilize the northwest portion of the site. Area 2 (Riverside Park) will continue to serve recreational visitors; a change in land use is not currently anticipated. It is also anticipated that Area 3 will not change use and will remain undeveloped and owned and maintained by MDT.

Section 2

Site Study Area Investigation and Removal Actions

Multiple investigation, pre-removal, and removal events have occurred at the site to date. This section discusses each of the events and presents analytical data and observations relevant to risk assessment and the FS. Discussions in this section are presented as the action or activity occurred chronologically and by area as shown on Figure 1-3. Each of the following events is summarized in this section:

Date of Investigation/Action	Investigation/Action Activity	Activity Lead
Area 1 – Former Export Plant		
1999, December	Soil sampling	EPA
2000, March/April	Soil and stationary air sampling	EPA
2000, June	Activity-based sampling (ABS)	EPA
2000, October/November	Removal of vermiculite and contaminated dust, soil, and debris	Grace
2001, March/April/August	Soil, bulk materials, and dust sampling	EPA
2001, September/October	Building demolition and removal of contaminated soil and debris	Grace
2002, April/May	Bulk materials and soil sampling	EPA
2002, October – December	Building demolition and removal of contaminated soil	Grace
2006, June	Soil sampling	EPA
2006, June – September	Water line installation (City of Libby)	EPA
2007, September – October	RI data gap sampling, site-wide soil sampling and indoor ABS	EPA
Area 2 – Riverside Park		
2003, May/July	Soil sampling	EPA
2003, September /October	Contaminant screening study (CSS), and pre-removal soil sampling	EPA
2003, October/November	Removal of contaminated soil	EPA
2007, July	Placement of rock cover in areas of observed vermiculite	City of Libby
2007, September	RI data gap sampling, site-wide soil sampling	EPA
2008, May	Site preparation for placement of pavilion footers	EPA
2008, July	Removal of contaminated soil	EPA
Area 3 – Embankments		
2007, September	RI data gap sampling, surface and subsurface soil sampling	EPA

2.1 Area 1 Investigation and Removal Activities

2.1.1 Area 1 Investigation Sampling – December 1999

In December 1999, a total of 80 soil samples (72 samples and 8 field duplicates) were collected from Area 1 of OU1. Sample locations were selected in accordance with the Sampling and Quality Assurance Project Plan (SQAPP) for Environmental Monitoring for Asbestos (Phase 1 SQAPP) (EPA 1999) and are depicted on Figure 2-1. All samples were collected as grab samples from the 0- to 2-inch, 0- to 24-inch, or 2- to 12-inch depth interval as shown in Table 2-1. Samples were collected, handled, and analyzed in accordance with the Phase 1 SQAPP (EPA 1999). Results by the National Institute for Occupational Safety and Health (NIOSH) polarized light microscopy (PLM) NIOSH Method 9002 (PLM-9002) (NIOSH 1994) varied between non-detect (ND) and 5 percent (%) LA. Sample locations and results are presented on Figure 2-1; results are shown in Table 2-1.

2.1.2 Area 1 Investigation Sampling – March/April 2000

2.1.2.1 Soil Sampling

In 2000, EPA requested additional soil samples be collected from Area 1 to supplement the December 1999 sampling and better characterize site soil. Between March 10 and 11, 2000, 17 grab soil samples and one duplicate were collected from the 0- to 2-inch depth interval, and 16 grab soil samples and five field duplicates from the 2- to 12-inch depth interval. One grab sample was also collected from bags of vermiculite stored outside the warehouse. All sample locations are shown on Figure 2-1. Samples were collected, handled, and analyzed in accordance with Revision 1 of the Phase 1 SQAPP (EPA 2000a). Results by PLM-9002 indicated levels of LA were present at concentrations ranging from ND to 10%. Results for the March 2000 event are shown on Figure 2-1 and summarized in Table 2-2. Locations of vermiculite observed during the March 2000 soil sampling event are shown on Figure 2-1.

2.1.2.2 Air Sampling

In addition to soil sampling, EPA requested stationary outdoor air sampling be conducted in order to establish baseline concentrations of LA in ambient air at the site. Accordingly, on separate days (April 4, 5, and 9, 2000), members of EPA's Response Engineering and Analytical Contract team collected stationary air samples (one field and one co-located sample each day) from various locations within the Area 1 boundary. Co-located air samples are samples collected side-by-side and are sometimes referred to as replicate samples. These samples are used to determine the reproducibility of a sample result.

Coordinate data are not available for these samples; therefore, sample locations are not presented graphically in this report. Samples were collected, handled, and analyzed in accordance with Revision 1 of the Phase 1 SQAPP (EPA 2000a); however, only the field samples were selected for analysis. The co-located samples remain in archive at a project-contracted laboratory. Results by the International Organization for Standardization (ISO) 10312 (ISO 1995) method indicated LA in ambient air at all

three sample locations at concentrations ranging from 0.0001 to 0.0023 structures per cubic centimeter (s/cc) (Table 2-3). The data set presented in Table 2-3 is too limited to draw any conclusions related to risk solely based on this data set. The average total LA concentration observed in 2006-2008 Libby Site ambient air sampling program was 0.00001 s/cc, indicating the ambient air at OU1 contained LA at concentrations above those currently considered to be ambient within the Libby Valley (EPA 2009).

2.1.3 Area 1 Investigation Sampling – June 2000

On June 25, 2000, EPA conducted personal air sampling during an ABS event. The intent of this ABS event was to aid in determining exposures to LA that result from routine activities in areas that contain Libby vermiculite. Two samplers were monitored during the event: one while sweeping the floor of the planar shop's break room; the other while sweeping and moving bags of vermiculite insulation inside the bag house portion of the planar shop (see build-out on the west side of the planar shop depicted on Figure 2-2). Results for the two personal air samples that were analyzed by ISO 10312 indicated LA in concentrations of 0.6470 s/cc and 2.3666 s/cc for the break room sweeper and the bag house worker, respectively. Table 2-4 presents these results of this sampling effort.

2.1.4 Area 1 Removal Event – July 2000 through January 2001

EPA issued a Unilateral Administrative Order (UAO) to Grace on May 23, 2000, based on the finding of LA at levels of concern in air and site soil in samples collected as part of sampling events described in Section 2.1. The primary activities required by the UAO and outlined in the EPA-approved Export Plant Removal Action Work Plan (URS 2000) were to temporarily relocate the onsite business (Millwork West), clean five onsite historic buildings (Figure 2-2) and the building's contents, excavate and dispose of vermiculite and LA-contaminated soil and debris, and restore the property. Work by Grace's contractors, was conducted between July 19, 2000 and January 5, 2001. During this period, the government provided oversight of activities to ensure compliance with the EPA-approved work plan, including health and safety protocols. Contaminated materials were disposed of at the former Libby vermiculite mine.

During soil excavation, confirmation soil sampling (i.e., samples collected from the floor of the excavation) was conducted by Grace's contractor. The 63 confirmation soil samples were analyzed by Grace's laboratory using PLM with dispersion staining method EPA/600/R-93/116 (EPA 1993a). At EPA's request, in order to expedite cleanup work and provide a quality control (QC) measure on samples analyzed by Grace, a portion of the confirmation soil samples were split and analyzed at EPA's onsite laboratory by PLM-9002. A total of 18 split samples and one duplicate split sample were handled and analyzed in accordance with the Removal Action Sampling and Analysis Plan (SAP) for Confirmation Sampling of Soil and Perimeter and Personal Sampling of Air for Asbestos, Revision 1 (EPA 2000b). Grace confirmation soil sample results, as reported in the Final Report Removal Activities at the Export Plant, Libby, Montana (URS 2001), as well as results of the split soil samples are presented in Table 2-5. Results ranged from ND to 2% LA; however, Grace was directed to remove soil in additional 4-6 inch increments until EPA clearance criteria (less than [$<$] 1% LA at depth) for confirmation soil sampling was met in each section

of the excavation. Sample locations and results for all confirmation soil samples collected as part of this removal event are shown on Figure 2-3.

The backfill materials used at Area 1 during 2000 were obtained from the Plum Creek pit located in Libby, an EPA-approved source for fill materials. Asbestos analytical results for the Plum Creek pit are provided in Appendix A; results of the additional analyses are available upon request. Restoration at Area 1 consisted of backfilling the entire excavated area with a sufficient layer of common fill to bring the grade to within 6 inches of the original surveyed grade. The final 6-inch layer was filled with either gravel or topsoil, as appropriate, depending upon the original surface conditions.

Personal air monitoring data are not available in the EPA project database for this removal action.

2.1.5 Area 1 Investigation Sampling – March/April/August 2001

Following reports of observations of vermiculite and mining waste at the site following the UAO cleanup, EPA requested additional sampling to determine if residual levels of LA remained at the site. This section discusses investigation soil, bulk materials, and dust sampling activities that occurred in 2001. All samples presented in this section were collected, handled, and analyzed in accordance with Revision 1 of the Phase 1 SQAPP (EPA 2000a).

2.1.5.1 Soil Sampling

A total of 15 soil samples were collected during 2001 at Area 1, as follows:

- Three grab samples were collected from the 0- to 1-inch depth interval at various locations near site buildings on March 2, 2001
- Five grab samples and one duplicate were collected from the 0- to 6-inch depth interval at various locations near site buildings on April 19, 2001
- One grab sample of in-place 1 ½ -inch minus grade fill material (from the Granite pit) from the 0- to 6-inch depth interval was collected on April 24, 2001. It is assumed that the sample was collected from fill material placed during the October/November 2000 removal event at Area 1.
- One 3-point composite sample was collected from the 0- to 4-inch depth interval at the site on/off ramp, and one 3-point composite sample (0- to 4-inch depth interval) near the BNSF railroad tracks on August 8, 2001
- Four grab samples were collected from the 0- to 4-inch depth interval on August 10, 2001

Locations and results for these soil samples are presented on Figure 2-1 (with the exception of the in-place fill material sample, for which no coordinate data is available) and results are summarized in Table 2-6. Results ranged from ND to 35% LA by PLM-9002; the in-place fill material sample was ND for LA. Locations of

vermiculite observed during the August 2001 soil sampling events are shown on Figure 2-1.

2.1.5.2 Bulk Materials Sampling

On April 19, 2001, 39 bulk material samples (e.g., wood shavings, insulation, debris, etc.) were collected from within the five buildings located at the site. Building locations are shown on Figure 2-2. Seven samples were collected within the pole barn; seven within the planar shop; six within the scale house/lumber storage building; 13 within the warehouse; and six within the shed. Results of the bulk material samples are presented in Table 2-7 and ranged from ND to 5% LA by PLM-9002.

2.1.5.3 Dust Sampling

Two single-point dust samples were collected on April 19, 2001: one from a horizontal surface inside the warehouse and the other from the exterior surface of the warehouse foundation. The location of the warehouse is shown on Figure 2-2. Results by ISO 10312 indicated loading of LA in dust on the building's foundation at 169,836 structures per square centimeter (s/cm^2), while the indoor sample was ND for LA. These results are presented in Table 2-8.

On August 28, 2001, four separate 3-point composite dust samples were collected from horizontal surfaces inside the pole barn, the surface of equipment stored inside the shed, and from the surface of equipment and supplies stored inside each of two site storage containers (i.e., connex boxes) (Figure 2-2). Samples were analyzed by ISO 10312. Results for the four sampled areas indicated LA loading in dust at 129,127 s/cm^2 ; 97,455 s/cm^2 ; 19,491 s/cm^2 ; and 40,200 s/cm^2 , respectively, as shown in Table 2-8.

2.1.6 Area 1 Removal Event – September/October 2001

As a result of soil, bulk materials, and dust investigation sampling conducted by EPA in spring and summer 2001 (Section 2.4), EPA required Grace to conduct a cleanup action to address residual LA contamination in site buildings and soil. The work was conducted between September 5 and October 17, 2001 in accordance with addenda to the Export Plant Removal Action Work Plan (URS 2000). Ultimately, four of the five buildings (all but the planar shop – see Figure 2-2) were demolished and additional soil was excavated from the site. The contaminated soil and debris was disposed of at the former Libby vermiculite mine. EPA contractors provided general oversight, health and safety monitoring, and confirmation dust and soil sampling during the removal. All samples were collected, handled, and analyzed in accordance with the Removal Action SAP (EPA 2000b). The following sections describe sample collection associated with the September/October 2001 Grace removal activities.

2.1.6.1 Dust Sampling

One 3-point composite dust sample was collected on September 6, 2001 from the surface of lumber that had been decontaminated and moved outside of the exclusion zone. This sample was analyzed by ISO 10312 and found to be ND for LA (Table 2-9).

On September 15, 2001, for informational purposes, one 3-point composite dust sample was collected from the surface of a lumber pile located inside the exclusion zone. Sample results by ISO 10312 indicated LA loading at 365 s/cm² (Table 2-9).

On October 12, 2001, six 3-point composite dust samples were collected in and around the planar shop. The location of this building is shown on Figure 2-2. Samples were collected at the following locations:

- Surfaces immediately outside the entrance to the building
- Surfaces of the sawdust exhaust chute outside the building
- Surface of the covered concrete pad outside the building
- Various horizontal surfaces inside the building
- Horizontal surfaces inside the building's lunch room
- Surfaces immediately inside the entrance to the building

All six samples were sent for analysis by ISO 10312; results indicated LA loading in dust in and around the planar shop at levels between 609 s/cm² and 444,636 s/cm². Table 2-9 presents these results.

2.1.6.2 Soil Sampling

On October 4 and 5, 2001, 23 subsurface confirmation soil samples were collected by EPA in association with oversight of the Grace removal activities. Subsurface samples were collected following a gridded approach from depths varying between 16 and 50 inches below ground surface (bgs) in the following areas: the former pole barn, former warehouse, former scale house/lumber storage building, former shed, east ball field (easternmost field of two ball fields that used to be centrally-located in Area 1), and BNSF spur extending just south of the planar shop. Refer to Figure 2-2 for these locations. Samples were composite samples with varying numbers of subsamples (between two and five); results were all <1% LA by PLM-9002 and are presented in Table 2-10.

In addition to subsurface confirmation soil sampling, 39 surface soil samples were collected on October 9 and 10, 2001 from areas that were previously remediated but suspected to have been impacted (i.e., cross contaminated) by current-year removal activities. These surface samples were 5-point composites from the 0- to 2-inch depth interval from the grid locations identified in Table 2-10. Results were either ND or <1% LA by PLM-9002 (Table 2-10). Eight additional soil samples were collected on October 16, 2001 from areas that were not anticipated to have been impacted by removal activities, in order to determine cleanup needs. Of the eight soil samples, six were surface samples from 0 to 2 inches bgs and two were subsurface samples from 8 to 10 inches bgs. Results of the surface samples were all ND for LA, while the subsurface samples were <1% LA (Table 2-10). As a result of these findings, EPA required Grace to cover all impacted areas with a 4-inch layer of crushed gravel. Locations and results for samples collected during October 2001 are shown on Figure

2-3. Final confirmation soil sample results (i.e., results of the final sample collected in each grid or excavation area) are shown on Figure 4-1 (top portion). Figure 4-1 (top portion) also depicts the cumulative backfill depths based on all soil removal activities conducted.

Similar to the 2000 removal work, restoration was conducted in accordance with the site work plan (URS 2000) and applicable addenda. Backfill materials were obtained from the Plum Creek gravel pit located in Libby, an EPA-approved source for fill materials. Analytical results of asbestos testing for the Plum Creek pit are provided in Appendix A.

2.1.6.3 Personal Air Monitoring Data

Personal air monitoring data collected during this removal effort are presented in Table 2-11. These sample results are provided for informational purposes only and are not used in the risk assessment for this site. As indicated in Table 2-11, 36 personal air samples collected during this removal action were analyzed by one or more of the following analytical methods:

- Phase contrast microscopy (PCM) by NIOSH 7400
- TEM by Asbestos Hazard Emergency Response Act of 1986 (AHERA) counting rules
- TEM by ISO Method 10312

There are several key differences between the PCM and TEM analytical methods. Analysis via PCM reports results in units of fibers per cubic centimeter (f/cc) while TEM reports results in units of s/cc. For PCM results reported as f/cc, only fibers that are longer than 5 microns (μm), have an aspect ratio greater than or equal to 3:1, and a thickness of greater than 0.25 μm are counted by this method. In addition, the PCM technique does not distinguish between asbestos and other fibers and counts all fibers meeting the criteria listed regardless of fiber composition. For TEM results reported as s/cc, only asbestos structures are counted; fibers of other composition are not counted toward the results. Typically when the TEM ISO method is used, asbestos structures are counted toward the result when their length is greater than 0.5 μm and aspect ratio greater is than or equal to 5:1.

Thirty samples were analyzed via TEM ISO 10312 (as modified by project-specific modifications) with total LA concentrations ranging from ND to 0.0919 s/cc. A total of 33 samples were analyzed via AHERA TEM with total LA concentrations ranging from ND to 0.09290 s/cc. A total of 32 samples were analyzed via the NIOSH 7400 PCM method with results ranging from ND to 0.231 f/cc. Results of all personal and stationary air monitoring results collected during removal activities at OU1 are provided in Appendix B.

2.1.7 Area 1 Investigation Sampling – April/May 2002

In response to concerns of site tenants regarding potential residual contamination, EPA conducted additional investigation sampling at the site during the spring of 2002. This section describes these bulk materials and soil sampling activities.

2.1.7.1 Bulk Materials Sampling

On April 9, 2002, two bulk materials samples were collected from the interior of equipment owned and operated by Millwork West. The samples were collected, handled, and analyzed in accordance with the Phase 1 SQAPP (EPA 2000a). Both samples were ND for LA by PLM-9002. Results are summarized in Table 2-12.

2.1.7.2 Soil Sampling

On May 8, 2002, two 3-point composite soil samples were collected from areas at the site where suspect mine-related material had been identified. At the time of sampling, visible vermiculite was noted near two metal connex boxes located on site. The visible vermiculite was believed to be the result of a test pit-like excavation adjacent to the BNSF railroad, which may have been tracked onto the clean fill placed by Grace during previous years' removal work. Samples were collected, handled, and analyzed in accordance with the Phase 1 SQAPP (EPA 2000a). Both samples contained <1% LA by PLM-9002, as shown on Figure 2-1 and summarized in Table 2-13. Locations of vermiculite observed during this soil sampling event are shown on Figure 2-1.

2.1.8 Area 1 Removal Event – October through December 2002

As a result of the concerns of site tenants regarding potential residual contamination resulting from the 2001 removal actions (Section 2.1.6), starting October 14, 2002, Grace began removing all remaining building material and debris from Area 1 at the direction of EPA. The work was conducted in accordance with addenda to the Export Plant Removal Action Work Plan (URS 2000). Addenda are available from the EPA Administrative Record. Contaminated soil from the footprint of the demolished planar shop and from an area near the BNSF railroad tracks was also removed. All contaminated soil and building material was disposed of at the former Libby vermiculite mine. During this work, EPA provided oversight and confirmation soil sampling support, as well as personal and perimeter health and safety air monitoring. Removal activities concluded on December 11, 2002.

As part of this removal event, removal oversight personnel collected a total of 44, 5-point composite subsurface confirmation soil samples on December 3, 2002 (Figure 2-3). A total of 36 soil samples were analyzed, while 8 samples were archived at a project-contracted laboratory. The subsurface samples were collected from the excavation floor, and followed a gridded approach in the main excavation zone. Sample depths averaged 18 inches bgs; however, three areas required excavation to depths of 38, 74, and 122 inches bgs due to encountering visible vermiculite and/or building foundations.

Confirmation soil samples were collected, handled, and analyzed in accordance with the Removal Action SAP (EPA 2000b). As shown in Table 2-14, results were either

ND or <1% LA by PLM-9002. Final confirmation soil sample results (i.e., results of the final sample collected in each grid or excavation area) are depicted on Figure 4-1 (top portion). Restoration was conducted in accordance with the site work plan (URS 2000) and applicable addenda using locally available EPA-approved backfill materials from the Plum Creek pit. Analytical results of asbestos testing for the Plum Creek pit for 2002 are provided in Appendix A. Excavation limits resulting from removal work conducted by Grace between 2000 and 2002 are depicted on Figure 4-1 (top portion). Figure 4-1 (top portion) also depicts the cumulative backfill depths based on all soil removal activities conducted to date.

During this removal action, a total of 10 personal air samples were collected in accordance with the Removal Action SAP (EPA 2000b) and analyzed by PCM via NIOSH 7400. PCM results ranged from ND to 0.492 f/cc. All results are provided in Table 2-15. The results of these samples are provided for informational purposes only and are not used in the risk assessment to calculate risk for this site. The results were used in a qualitative manner to support lines of evidence regarding potential exposures at the site (Section 6.5.3.2). Results of all personal and stationary air monitoring results collected during removal activities at OU1 are provided in Appendix B.

2.1.9 Area 1 City Water Line Installation – June through September 2006

In the summer of 2006, the City of Libby began excavating a trench through the field portion of Area 1 parallel to City Service Road in preparation for installing a new drinking water supply pipeline (Figure 2-4). Quantities of vermiculite were encountered in localized areas near the existing hydrant at depths between 10 and 36 inches bgs. Following the discovery of vermiculite, the city halted work.

In June 2006, EPA requested samples be collected from the soil stockpiled during the initial pipeline excavation. A total of eight, 5-point composite soil samples were collected: four from the surface two inches of the stockpiled material and four from the 0- to 2-inch depth interval in the area immediately surrounding the stockpile. Samples were collected, handled, and analyzed in accordance with the Draft Final Response Action Work Plan (EPA 2003). Sample locations and results by PLM-9002 are shown on Figure 2-1. Results ranged from ND to 3% LA, and are presented in Table 2-16.

As a result of discussions between the city, EPA, and the Volpe Center, an addendum (CDM 2006) to the Draft Final Response Action Work Plan (EPA 2003) was prepared in order to safely complete the water line installation. This work was carried out between August 24 and September 21, 2006, during which EPA provided oversight and air monitoring in accordance with the response action work plan and addendum. All soil removed was transported to the mine for disposal, including the soil stockpiled during the initial excavation work completed by the city. The location of the newly-installed city water pipeline is shown on Figure 2-4.

2.1.10 Other Area 1 Activity

During an August 22, 2007 site visit, approximately 50 cubic yards of angular rock (riprap) was observed in several piles along the south side of City Service Road, approximately half way between the City Service Road/Highway 37 intersection and the David Thompson Search and Rescue building. According to the city, the riprap was obtained from the United States Army Corps of Engineers' pit (located on Fisher River Road approximately 17 miles east of Libby) for the purpose of covering two areas of exposed orange fencing: one along the Kootenai River bank in between the new and old boat ramps and the other on the surface of the old boat ramp (see Section 2.2.3 for description of the use of orange fencing in this area).

2.1.11 Area 1 Investigation Sampling – September to November 2007

By comparing the potential exposure pathways and contaminated media of concern to the existing data set for OU1, presented in the Data Summary Report (CDM 2007a), a data gap analysis (CDM 2007b) was performed to determine additional sample collection efforts that would be required to gather the remaining information needed for the completion of a risk assessment specific to OU1. Based on the data gap analysis the *Final OU1 Data Gap Sample Collection SAP* (CDM 2007c) was developed. All sample collection efforts described in the following sections followed the details described in this SAP. The following sections summarize the data collected as part of this effort specific to Area 1.

2.1.11.1 Surface Soil Sampling

Between September 12 and 21, 2007, a total of 42 surface (0-6 inches bgs) soil samples (including 3 field duplicates) were collected from Area 1. Samples were collected as 30-point composite samples using a grid pattern.

The samples were processed (i.e., dried, sieved, ground) at CDM's close support facility (CSF) in accordance with the Close Support Facility Soil Preparation Plan, Revision 1 (CDM 2004) and sent for analysis by the PLM visual estimation (PLM-VE) and gravimetric (PLM-Grav) methods (Syracuse Research Corporation [SRC] 2003). Following processing, the VE method is typically applied to the fine fraction of a soil sample while the gravimetric method is typically applied to the coarse fraction. As such, a coarse fraction (and corresponding PLM-Grav result) will not exist if all of the dried sample material passes through a ¼-inch mesh screen. The material passing through the ¼-inch mesh screen constitutes the fine fraction. EPA is in the process of evaluating the accuracy and replicability of each of these methods. However, based on EPA's performance evaluation study to date, PLM-VE results are currently being used to make project removal decisions. Therefore, for the purposes of this report, only PLM-VE results are presented.

Sample results for the 2007 soil investigation activities are shown in Figure 2-5, and summarized in Table 2-17. The following table summarizes the number of samples with detectable levels of LA.

Summary of PLM Results in Area 1					
Location	Number of Samples Collected	Number of Samples With PLM-VE Detections			
		ND	TR	<1%	≥1%
Area 1	42	29	13	0	0

Notes: PLM – polarized light microscopy; LA – Libby amphibole; VE – visual estimation; ND – non-detect; TR – trace; < - less than; % - percent; ≥ – greater than or equal to

As part of the soil sample collection, observations of the amount of visible vermiculite were made according to the Libby Site-specific guidance for the *Semi-Quantitative Visual Estimation of Vermiculite in Soils and Residential and Commercial Properties* (CDM-LIBBY-06, Revision 1 [CDM 2007d]). In Area 1, a total of 1,170 point inspections for visible vermiculite (or visual point inspections) were recorded. The following table summarizes the relative amounts of vermiculite observed, and Figure 2-5 illustrates the individual point inspections where vermiculite was observed.

Summary of Visible Vermiculite Observations in Area 1					
Location	Total Number of Visual Point Inspections	Relative Amount of Vermiculite Observed			
		None	Low	Medium	High
Area 1	1,170	1,032	118	16	4

As the summary table above indicates, vermiculite was not observed in the majority (88.2%) of the point inspections in Area. Low levels of vermiculite were observed at 10.1% of the point inspections; medium levels were observed at 1.4% of the point inspections; and high levels were observed at 0.3% of point inspections in Area1.

2.1.11.2 Indoor ABS Sampling

To estimate human exposure levels to LA from indoor air, an ABS sampling event specific to OU1 was conducted in the search and rescue building between October 30 and November 8, 2007. ABS consisted of both passive and active behaviors completed separately in the garage and meeting room areas. All samples were analyzed by TEM using ISO 10312 counting rules as modified by project-specific laboratory modifications. A total of 22 air samples were collected during the indoor ABS activities, as shown in the following table:

Summary of OU1Search and Rescue Building Indoor ABS Air Sampling			
Location	ABS Activity Type	Dates Conducted	Number of Samples Collected
Garage	Active	10/30/2007	4*
		10/31/2007	5*
		11/1/2007	7*
Meeting Room	Passive	11/6/2007	1
		11/7/2007	1
		11/8/2007	1
	Active	11/6/2007	1
		11/7/2007	1
		11/8/2007	1
Total			22

Notes: OU1 – Operable Unit 1; ABS – activity-based sampling; * During the active scenario in the garage area, when visible loading was observed on the sample cassette, sample collection was continued on a new cassette and all cassettes sent for analysis

Table 2-18 summarizes the results of the air samples collected during the ABS activities. Results of the active-garage scenario ranged from ND to 0.0699 s/cc; active-meeting room results ranged from 0.0011 s/cc to 0.0088 s/cc; and passive-meeting room results ranged from 0.0003 s/cc to 0.0079 s/cc.

Microvacuum dust samples were also collected from the garage, meeting room, and emergency response vehicles. While the SAP did not prescribe the collection of microvacuum samples from the vehicles, the search and rescue group did not want EPA contractors using the vehicles as part of the ABS activities. Thus, in order to gather data regarding the dust levels in the vehicles, microvacuum samples were collected instead of ABS. A total of nine dust samples were collected from the building, three each from the meeting room, garage, and rescue vehicles. All samples were analyzed by TEM using ISO 10312 counting rules as modified by project-specific laboratory modifications. Table 2-19 summarizes the results of the microvacuum air samples. LA was detected in one sample collected from the meeting room and one sample collected from the garage. The total LA loading for the meeting room and garage dust samples were reported at 75 and 20 s/cm², respectively.

2.1.11.3 Personal Air Sampling

To prepare Area 1 for soil sampling, vegetation overgrowth was removed using a bush hog. While vegetation removal was being performed, personal air samples were collected from the workers operating the bush hog. To mitigate any fugitive dust emissions from the site during the bush hogging, the ground in the areas with vegetation overgrowth was wetted prior to bush hogging. A total of eight personal air samples were collected during this activity. Most of the ground in the area where bush hogging occurred contained visible vermiculite at low to moderate levels as defined by CDM-LIBBY-06, Revision 1 (CDM 2007d). The personal air samples were submitted for analysis by both PCM (NIOSH 7400) and TEM (ISO 10312) as modified by project-specific laboratory modifications. Table 2-20 summarizes the personal air

sample results. Of the eight samples collected, LA was detected in six samples by ISO 10312 concentrations ranged from 0.0038 s/cc to 0.0715 s/cc.

2.2 Area 2 Investigation and Removal Activities

2.2.1 Area 2 Investigation Sampling – May/July 2003

The City of Libby initiated renovations at Riverside Park in May 2003. A 2-inch thick layer of vermiculite along the west side of the boat ramp was discovered during construction of a new boat ramp. The layer was approximately 8 to 10 inches below the ground surface and was exposed along the ramp. Additional vermiculite containing soil was exposed during renovation of the picnic area when overburden material was scraped off the top of the bank west of the new boat ramp. Subsequent personal communications with former city worker's indicated that the vermiculite found in this area was scraped from Area 2 and used to fill in low spots in Area 1.

In response to the discovery of contaminated material at the site, a visual inspection and soil sampling was conducted on May 22, 2003. Visible vermiculite was observed in the park and along the banks of the Kootenai River. In conjunction with the inspection, three soil samples were collected from the Riverside Park boat ramp. The samples were 5-point composites from the 0- to 1-inch depth interval and were collected, handled, and analyzed in accordance with the Phase 1 SQAPP (EPA 2000a). Results for the samples were ND by PLM-9002 (Figure 2-1 and Table 2-21). Following the inspection and receipt of sample results, EPA covered and fenced-off those areas with the greatest amounts of visible contamination in order to mitigate any short-term exposure risk. Erosion control fabric and silt fences were installed along the riverbank as interim protective measures until the site was remediated in the fall of 2003.

On July 19, 2003, two soil samples were subsequently collected at the boat ramp – one from the north and south edges of the concrete pad and the other from the area east of the pad. Both samples were 5-point composites from the 0- to 6-inch depth interval. These samples were collected, handled, and analyzed in accordance with the Phase 1 SQAPP (EPA 2000a). The July 2003 soil samples were initially sent for analysis by PLM-9002 then subsequently processed at the CDM CSF and analyzed by PLM-VE and PLM-Grav, as applicable. The results of the samples (PLM-VE only) are presented in Table 2-21.

2.2.2 Area 2 Pre-Removal Event – September/October 2003

Pre-Removal characterization was conducted in accordance with the Final Remedial Investigation and Removal Action Work Plan for Riverside Park (CDM 2003a). These activities included a verbal interview with city park personnel, visual inspection of the site, and collection of both surface and subsurface soil samples. These activities were completed between September 9 and 15, 2003.

2.2.2.1 Verbal Interview

Dan Thede, Libby's Supervisor of City Services, was interviewed on September 15, 2003 to discuss historical use of Riverside Park. In summary, Mr. Thede confirmed use of the area for storing vermiculite during the period of operations at the site.

2.2.2.2 Property Inspection

During the September 2003 visual inspection, vermiculite was observed at several locations within the park but was generally concentrated in areas on the river side of the former access road that ran through the property, including the entire length of the riverbank. Notable amounts of vermiculite were also observed on the southwest side of the embankment (Area 1 side) of City Service Road. Lastly, an isolated area of vermiculite was located at the bottom of the embankment of City Service Road on the east side of Highway 37. The general location of vermiculite found during this site inspection is shown on Figure 2-1; however, the extent of the vermiculite has not been recorded to date.

2.2.2.3 Soil Sampling

Soil sampling activities occurred between September 9 and 13, 2003 and included both surface and subsurface test pit samples. All samples were collected, handled, and analyzed in accordance with the work plan for the event (CDM 2003a). In summary, seven surface soil samples were collected within the park; three surface soil samples were collected along the riverbank on the north side of the park; nine surface soil samples were collected on the north and five surface samples collected on the south side of the embankment of City Service Road between Highway 37 and the entrance to the park (Figure 2-1). Embankment samples were collected at 50-foot intervals as described in the work plan. It should be noted that although the embankment samples were collected as part of the Riverside Park (Area 2) work plan, the embankment is included as part of Area 1 for the purpose of potential future investigation and cleanup efforts. All surface samples were either 4- or 5-point composites from the 0- to 6-inch depth interval.

For subsurface sampling, 12 test pits were excavated and sampled, including one test pit that was dug at a later date (October 23, 2003) during subsequent removal work. Grab samples were collected at depths ranging from 12 to 39 inches bgs. The work plan stipulated that six of the test pits would have a second test pit excavated offset either 50 feet toward the site or 30 feet toward the river, depending on whether or not visible vermiculite was encountered in the six test pits. Four of these secondary offset test pits were excavated. Detailed test pit observations can be found in the Remedial Investigation and Removal Action Work Plan for Riverside Park Final RI Results Addendum (CDM 2003b).

All soil samples collected during this event were processed at CDM's CSF in Denver in accordance with the soil preparation plan (CDM 2004) and analyzed for LA using two techniques: PLM-VE and PLM-Grav (SRC 2003). Again, for the purposes of this report, only PLM-VE results are presented. Locations and results for all Riverside Park pre-removal soil samples are presented on Figure 2-1, and results are summarized in Table 2-22.

As indicated in Table 2-22, LA was observed in nine of the 26 surface soil samples collected at concentrations ranging from trace to <1%. Of the 18 subsurface soil samples collected, LA was observed at trace levels in three samples.

2.2.3 Area 2 Removal Event – October/November 2003

Based on visual inspections and the results of pre-removal surface and subsurface soil sampling at Area 2, EPA determined that site soil required removal. In general, the Riverside Park removal work plan (CDM 2003a) called for soil excavation to a depth of 12 inches bgs throughout the entire park area, with the exception of the Kootenai riverbank and the embankment on the northeast side (the river side) of City Service Road. Soil in these two locations was excavated to a depth of 6 inches bgs.

Excavation of the embankment on the southeast side of City Service Road has not yet been conducted but may be coordinated with other cleanup at OU1. In accordance with the Riverside Park work plan (CDM 2003a), which took into account visible vermiculite in addition to LA analytical results, additional 6-inch lifts were removed if vermiculite was visible at the floor of the excavation. This iterative process was carried throughout the site, with a maximum excavation depth of 3 feet below original ground surface elevation, except for the riverbank and City Service Road embankment, where maximum excavation depths were 12 inches bgs.

A total of 59 confirmation soil samples were collected between October 2 and November 13, 2003. Samples were 5-point composites and were collected from the floor of the excavation at depths of 6 inches up to 36 inches bgs. Results by PLM-9002 for all samples were either ND or <1% LA, with the exception of one sample (1R-24096) in the southwest portion of Area 2 (refer to Figure 2-3). The result for sample 1R-24096 was 2% LA, prompting the removal of an additional 6-inch layer of material from this area in accordance with the removal work plan. Sample results following the additional excavation were <1% LA by PLM-9002 (sample 1R-24100). Log notes indicate that two other areas were re-sampled at the discretion of onsite removal oversight personnel although the preliminary confirmation soil sample results met the soil clearance criterion of <1% LA. Details of these samples (1R-21996 and 1R-24099) are noted in the Location Description column of Table 2-23. All sample locations and results for the Riverside Park cleanup are shown on Figure 2-3 and summarized in Table 2-23.

Following excavation and confirmation soil sampling, the area was restored in accordance with the work plan (CDM 2003a). Restoration consisted of backfilling the site to grade using materials from the Boothman Pit, a local EPA-approved fill source, and hydroseeding as required. Analytical results of asbestos testing for the Boothman pit for 2003 are provided in Appendix A; results of the additional fill tests are available upon request. It should be noted that orange snow fencing was placed at depth (i.e., on the excavation floor) to indicate the presence of vermiculite in the event that soil in these areas is disturbed in the future.

As part of planned improvements by the city and in conjunction with the 2003 Area 2 removal work, a new boat ramp was installed downstream of the existing boat ramp. Prior to removal work, the city obtained riprap from the United States Army Corps of Engineers' pit located on Fisher River Road. The riprap was placed along the toe of the bank in the area just downstream of the new boat ramp. This riprap was removed, washed, and replaced during excavation activities. During restoration, topsoil was placed within the interstitial spaces of the riprap. Also prior to removal work, the city obtained riprap to be installed into the river about three-quarters of the way from the

new boat ramp to the existing boat ramp in order to slow the velocity of the water in the area of the new boat ramp. The removal contractor (Environmental Restoration) placed this riprap in consultation with the city during restoration activities.

A total of eight personal air samples were collected and analyzed by PCM via NIOSH 7400 during this removal action. PCM results ranged from ND to 0.120 f/cc. All results are provided in Table 2-24. The results of these samples are provided for informational purposes only and are not used in the risk assessment for this site. Results of all personal and stationary air monitoring results collected during removal activities at OU1 are provided in Appendix B.

2.2.4 Other Area 2 Activity – July 2007

In July 2007, EPA was asked to address subsurface vermiculite that was brought to the surface during the installation of cable by a phone company. The company was installing a cable throughout the extent of Area 2, in a generally east to west line, at a depth of approximately two feet bgs. Vermiculite was exposed at the easternmost toe of the area previously excavated during the 2003 Riverside Park cleanup; however, excavation was halted once the orange snow fencing, which was placed over areas of vermiculite containing soil in 2003, was encountered. EPA responded by covering the area with four to six-inches of rock.

2.2.5 Area 2 Investigation Sampling – September 2007

A total of nine, 30-point composite surface samples were collected between September 12 and 17, 2007. The samples were collected from 3- to 6- inch interval using a gridded approach. All samples were submitted for analysis using PLM-VE and PLM-Grav, as applicable. Sample results for each sampling grid are shown in Figure 2-5 (PLM-VE results only) and summarized in Table 2-25 (PLM-VE results only). The following table summarizes the number of samples with detectable levels of LA.

Summary of PLM Results in Area 2					
Location	Number of Samples Collected	Number of Samples With PLM-VE Detections of LA			
		ND	TR	<1%	≥1%
Area 2	9	9	0	0	0

Notes: PLM – polarized light microscopy; LA – Libby amphibole; VE – visual estimation; ND – non-detect; TR – trace; < – less than; % – percent; ≥ – greater than or equal to

As part of the soil sample collection, observations of the amount of visible vermiculite were made according to CDM-LIBBY-06, Revision 1 (CDM 2007d). In Area 2 a total of 270 point inspections for visible vermiculite were made. The following table summarizes the relative amounts of vermiculite observed in these areas, and Figure 2-5 shows the individual point inspections where vermiculite was observed.

Summary of Visible Vermiculite Observations in Area 2
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Location	Total Number of Visual Point Inspections	Relative Amount of Vermiculite Observed			
		None	Low	Medium	High
Area 2	270	242	28	0	0

As the summary table above indicates vermiculite was not observed at the majority (89.6%) of the point inspections. Low levels of vermiculite were observed at 10.4% of the point inspections in Area 2.

2.2.6 Area 2 Quick Response Removal Event – May 2008

In May 2008, EPA excavated soil required to place foundation footings and a full concrete slab to assist the City of Libby with the construction of a new pavilion in Area 2. Two areas, adjacent to each other were excavated. The area requiring excavation for the footings was excavated to an approximate depth of 57 inches bgs. Approximately 808 cubic yards (yd³) of material was excavated from this area. The second area was excavated to provide an access ramp. Approximately 21 yd³ of material was excavated from this area. Restoration activities were performed by the City of Libby using 3 inches of EPA-approved common fill compacted to 95% of standard Proctor. Confirmation soil samples were not collected at the bottom of these excavations.

2.2.7 Area 2 Quick Response Removal Event – July 2008

On June 30, 2008, several small areas containing medium to high amounts of vermiculite as well as what appeared to be raw LA were found on the surface of the gravel driveway, parking area, and the eastern portion of City Service Road. The type of vermiculite observed in this area was unlike any previously observed at this site, and it is suspected the vermiculite was imported as it was not observed during the September 2007 sampling events conducted in this area. The vermiculite was removed from the surface in these areas via hand pick up and surface vacuum of the areas where the material was observed. EPA approved the use of visual inspection as the clearance criteria for these areas; no vermiculite was observed in these areas after the removal was completed.

2.3 Area 3 Embankment Investigation Activities – September 2007

2.3.1 Surface Soil Sampling

A total of 22, 30-point composite surface samples (0-6 inches bgs) were collected from Area 3 embankment areas during 2007 investigation activities. The samples were collected using a grid; the sample results for each sampling grid are shown in Figure 2-5 (PLM-VE only) and summarized in Table 2-26 (PLM-VE only). All samples were submitted for PLM-VE, and PLM-Grav, as applicable. The following table summarizes the number of samples with detectable levels of LA.

Summary of PLM Results in the Area 3 Embankments					
Location	Number of Samples Collected	Number of Samples With PLM-VE Detections of LA			
		ND	TR	<1%	≥1%
Area 3 - Embankments	22	19	2	1	0

Notes: PLM – polarized light microscopy; LA – Libby amphibole; VE – visual estimation; Grav – gravimetric; ND – non-detect; TR – trace; < – less than; % – percent; ≥ – greater than or equal to

As part of the soil sample collection, observations of the amount of visible vermiculite were made according to CDM-LIBBY-06, Revision 1 (CDM 2007d). In the embankment areas, a total of 660 point inspections for visible vermiculite were made. The following table summarizes the relative amounts of vermiculite observed in these areas, and Figure 2-5 shows the individual point inspections where vermiculite was observed.

Summary of Visible Vermiculite Observations in the Area 3 Embankments					
Location	Total Number of Visual Point Inspections	Relative Amount of Vermiculite Observed			
		None	Low	Medium	High
Area 3 – Embankments	660	584	58	14	4

As the summary table above indicates, vermiculite was not observed at the majority (88.5%) of point inspections in the Area 3 embankments. Low levels of vermiculite were observed at 8.8% of the point inspections; medium levels were observed at 2.1%; and high levels of vermiculite were observed at 0.6% of the embankment point inspections.

2.3.2 Subsurface Soil Sampling

As part of the sampling efforts conducted in the Area 3 embankment areas, 15 grab soil samples were collected from 0 to 24 inches bgs. The purpose of these samples was to determine if large quantities of vermiculite were used to construct the embankments. These samples were submitted for analysis using PLM-VE and PLM-Grav, as applicable. LA results ranged from ND to trace and vermiculite was not observed in any of the 15 samples. Table 2-27 summarizes the PLM-VE results of these samples.

2.4 Other OU1 Investigation Activities

To estimate the human health risk associated with inhalation of LA in outdoor ambient air in and around the City of Libby, an outdoor ambient air monitoring program was designed for OU4. The details regarding sampling collection and methodologies are described in two documents:

- Final, Revision 1 Sampling and Analysis Plan for Outdoor Ambient Air Monitoring at the Libby Asbestos Site, Operable Unit 4, Libby (OU4 Ambient Air SAP [CDM and SRC 2006])
- Final Addendum, Sampling and Analysis Plan for Outdoor Ambient Air Monitoring at the Libby Asbestos Site, Former Processing Areas, Operable Units 1, 2, 5, and 6, Libby (Processing Areas Ambient Air SAP [CDM and SRC 2007])

All ambient air samples collected in accordance with these two documents were analyzed by TEM using ISO 10312 counting rules as modified by project specific laboratory modifications. The sampling frequency at each of the locations varied throughout the ambient air program. From October 2006 to October 2007, samples were collected on a 10 day schedule (5 days of sample collection followed by 5 days without sample collection). From November 2007 to January 2008, samples were collected on a 15 day schedule (5 days of sample collection followed by 10 days without sample collection).

For the purpose of estimating LA concentrations in outdoor ambient air specific to OU1, the four Libby Site-wide sampling locations nearest to OU1 were identified as follows:

- L1 - 1915 Kootenai River Road
- L2 - 247 Indian Head Road
- L4 - 501 Mineral Avenue
- L5 - 1427 Highway 37N/J. Neils Park

Figure 2-6 shows the location of all the ambient air sampling locations and also depicts the location of the four sampling stations used to evaluate the ambient air at OU1. There are total of 143 sample results from these four locations, as summarized in the following table (EPA 2009).

Summary of Outdoor Ambient Air Samples

Sample Location		Total Number of Samples
ID Number	Address	
L1	1915 Kootenai River Road	37
L2	247 Indian Head Road	30
L4	501 Mineral Avenue	38
L5	1427 Highway 37 N	38
	J. Neils Park	
Total		143

As indicated in the outdoor ambient air summary report (EPA 2009) total LA data set for these sample locations, the total LA concentrations for the outdoor ambient air samples from these locations ranged from ND to 0.00016 s/cc. The average total LA concentration observed during 2006-2008 Libby Site ambient air sampling program was 0.00001 s/cc (EPA 2009). A total of 32 of the 143 samples collected from the four sampling stations listed above had total LA concentrations above 0.00001 s/cc (EPA 2009). All remaining 111 samples had total LA concentrations at or below the Libby Site average ambient air total LA concentration.

2.5 Quality Assurance/Quality Control

For work conducted by EPA and its contractors in Libby, quality assurance/quality control (QA/QC) measures include, but are not limited to, the collection of QC samples (such as duplicate samples and field blanks), implementation of a laboratory quality assurance (QA) program, review of project reports generated by CDM by an approved CDM QA staff member, and an auditing component to assess the effectiveness of the QA program.

The following sections describe the following QA/QC components implemented for work conducted by EPA and its contractors at OU1: collection of field QC samples; changes to procedures in guidance documents; data usability; and achievement of data quality objectives (DQOs).

All QA/QC components for measurement reports required by EPA Region 8 (i.e., precision, accuracy, representativeness, completeness, and comparability) are addressed in the Draft Quality Assurance and Quality Control Summary Report for the Libby Asbestos Superfund Site (SRC 2007).

2.5.1 Field Quality Control Sample Collection

2.5.1.1 Air and Dust

Two types of air and dust QC samples were collected by sampling personnel: lot blanks and field blanks. These QC samples were collected in accordance with the governing documents for each sampling event as described in this section. Lot blank data collected in Libby indicate asbestos fiber counts below the detection limit of the analytical

method; therefore, air and dust cassettes were deemed usable for sampling at OU1. Libby lot blank data is provided in Appendix C. Field blank data for OU1 indicate asbestos fiber counts below the detection limit of the analytical method. OU1 field blank data is provided in Appendix D.

In addition to lot blanks and field blanks typically collected for air and dust samples, co-located samples and drying blank samples were also collected as QC samples for the ambient air program (CDM and SRC 2006). Results for ambient air co-located samples and the related paired field sample are presented in Appendix E. As shown in Appendix E, a total of 40 co-located samples were collected. LA was detected in two co-located samples and of these only one of the corresponding field samples contained LA. Because most of the results of the co-located and paired field samples results were ND for LA, concordance rates cannot be calculated.

Drying blanks were collected to determine if the process of drying wet (air sample) filters introduced any asbestos fibers to the filter prior to analysis for LA. A total of nine drying blank samples were collected; all of which were ND for LA. Results for the drying blanks are provided in Appendix F.

Overall field QC sample collection frequency and data evaluation for the Libby Site is presented in the Draft Quality Assurance and Quality Control Summary Report for the Libby Asbestos Superfund Site (SRC 2007).

2.5.1.2 Soil

Equipment blanks and field duplicate samples comprise the two types of soil QC samples collected at OU1. These QC samples were collected in accordance with the governing documents for each sampling event as described in this section.

Equipment blanks were only required as part of the pre-removal sampling at Riverside Park and were collected at the required frequency of one per day. Analytical results for these field QC samples were all ND for LA (Appendix G).

Soil duplicate sample collection frequency and data evaluation for the Libby Site is presented in the Draft Quality Assurance and Quality Control Summary Report for the Libby Asbestos Superfund Site (SRC 2007). To date, field QC samples for confirmation soil sampling is not required at the Libby Site.

2.5.2 Field Modifications to Governing Documents

Field modifications to the governing documents were approved by EPA and implemented by field staff during activities at OU1. Signed modification forms are located at the EPA Records Center. No negative implications or biases to data have been noted as a result of these modifications. Details regarding the modifications to each governing document are provided in Appendix H.

2.5.3 Data Usability

Data collected at OU1 were evaluated by the EPA On-Scene Coordinator (for emergency response data) or government-contracted staff in consultation with EPA or

Volpe Center representatives. Data was not validated past that which is required by the analytical laboratories' QA/QC program.

2.5.4 Achievement of Data Quality Objectives

Each guidance document referenced in this report describes the DQOs identified for each data collection event conducted at OU1 or the Libby Site as a whole. Data collected under the 1999 or 2000 Phase 1 SQAPPs are under review by the EPA project team as part of the human health risk assessment; however, the general Phase 1 objectives were met. All other work plan-specific DQOs were met.

Section 3

Physical Characteristics of the Study Area

The site encompasses an area of approximately 17 acres, and is situated on the south side of the Kootenai River, just north of the downtown area of the City of Libby, Montana (Figure 1-2). The property is bounded by the Kootenai River on the north, Highway 37 on the east, the BNSF railroad thoroughfare on the south, and State of Montana property on the west (CDM 2007a).

3.1 Physical Setting

3.1.1 Surface Features

Area 1 is currently owned by the City of Libby and is undeveloped. In 2004, the David Thompson Search and Rescue organization constructed a building containing a main office and a five-bay garage on the northwest portion of the site on the south side of City Service Road (also known as West Thomas Street) (CDM 2007a).

Area 2 is also currently owned by the city and serves a variety of recreational visitors. The main features of the park include two boat ramps, two pavilions, picnic tables, and a pumphouse.

City Service Road is a partially paved access road for several residential and commercial properties west of the site.

3.1.2 Meteorology

Libby has a relatively moist climate, with annual precipitation in the valley averaging slightly over 20 inches (this includes approximately 60 inches of snowfall). Surrounding higher elevations receive significantly more precipitation. During the winter months, moist Pacific air masses generally dominate, serving to moderate temperatures and bring abundant humidity, rain, and snow. Colder, continental air masses occasionally drop temperatures significantly, but generally only for shorter periods. The average temperatures in December and January are 25 to 30 degrees Fahrenheit (°F).

During summer, the climate is warmer and dryer, with only occasional rain showers and significantly lower humidity and soil moistures. High temperatures of greater than 90°F are common. The average temperature in July is approximately 65 to 70°F. Spring and fall are transition periods.

Due to its valley location along the Kootenai River and downstream of the Libby dam, fog is common in the Libby valley. This effect is most pronounced during winter and in the mornings. Inversions, which trap stagnant air in the valley, are also common. Winds in the Libby valley are generally light, averaging approximately 6 to 7 miles per hour. Prevailing winds are from the WNW, but daily wind direction is

significantly affected by temperature differences brought about by the large amount of vertical relief surrounding the area.

3.1.3 Surface Water Hydrology

The Kootenai River, which flows adjacent to the site, has its origins in British Columbia's Kootenay National Park in Canada. From there it flows 485 miles into northwest Montana and through the towns of Libby and Troy. From there it flows into northern Idaho, then back into Canada and Kootenay Lake. Ultimately it joins with the Columbia River. Sixteen miles north of Libby, the river is held back by Libby Dam, creating a 90-mile long reservoir called Lake Koocanusa which reaches into Canada (LibbyMT.com. 2007).

As previously stated, Libby has a relatively moist climate with annual valley precipitation slightly over 20 inches. Higher elevations receive significantly more precipitation and account for much of the creek flow. Seasonal fluctuations cause varying levels of runoff and creek flow. Typically, runoff is most significant in spring when snow at higher elevations begins to melt. Summer precipitation does occur; however, typical summer weather is hot and dry and creek flow is moderated by high elevation lakes.

3.1.4 Geology

The mountains surrounding Libby are generally composed of folded, faulted, and metamorphosed blocks of Precambrian sedimentary rocks and minor basaltic intrusions. Primary rock types are meta-sedimentary argillites, quartzites, and marbles (Ferreira et al. 1992).

Excluding vermiculite-related materials that may be present, x-ray diffraction (XRD) analyses by the USGS of shallow, subsurface soil from more than ten sites in the Libby area show that it is comprised of major (greater than 20%) quartz, minor (5-20%) muscovite (and/or illite) and albitic feldspar, trace (<5%) orthoclase, clinoclase, non-fibrous amphibole (likely magnesiohornblende), calcite, amorphous material (probably organic) and possible pyrite and hematite. Other minerals will be present at levels below 0.5% and are generally not detectable by routine XRD analysis. These mineral components represent the average components for the area and will vary to some extent depending on location and history. Surface soil contains the above components with the addition of more organic material (USGS 2002).

The vermiculite deposit located at Vermiculite Mountain, the source of LA, is located approximately 7 miles northwest of the town of Libby in the Rainy Creek drainage. The vermiculite deposit specific to the Libby Mine is classified as a deposit within a large ultramafic intrusion, such as pyroxenite plutons, which is zoned and cut by syenite or alkalic granite and by carbonatitic rock and pegmatite. The formation of vermiculite and asbestiform amphiboles in the Libby mine deposit, have been assessed to be the result of the alteration of augite by high-temperature silica-rich solutions (USGS 2002).

The Vermiculite Mountain deposit is contained within the Rainy Creek alkaline-ultramafic complex. The Rainy Creek complex is described as the upper portion of a hydrothermally altered alkalic igneous complex composed primarily of magnetite pyroxenite, biotite, pyroxenite, and biotite. The original ultramafic body is an intrusion into the Precambrian Belt Series of northwestern Montana with a syenite body southwest of the adjacent to the altered pyroxenite and is associated with numerous syenite dikes that cut the pyroxenites.

3.1.5 Soil

Soil is largely derived from the pre-Cambrian rocks, which break down to form loamy soil composed of sand and silt with minor amounts of clay. The Libby valley area is somewhat enriched in clays due to its river valley location, and the dense forest of the region contributes organic matter to the soil. Much of the original soil in the area now occupied by the town of Libby has been modified by human activities. These include addition of vermiculite from the Rainy Creek Complex to the soil, reworking of the soil during construction, road building, railroad operations, gardening, processing of vermiculite (i.e., expansion), and other activities. Soil generally varies in color from tan to gray to black.

3.1.6 Hydrogeology

The Libby basin is hydrologically bound to the west by the pre-Cambrian bedrock, to the north by the Kootenai River and to the east by Libby Creek. The southern boundary of the basin extends under the high terrace of glacial lake bed sediments and with the alluvium of Libby Creek (Woodward-Clyde Consultants 1988).

The sediments overlying bedrock in the vicinity of the town of Libby are of glacial, glaciofluvial or alluvial origins. The site stratigraphy is characterized by lenses of interbedded units consisting of gravels, sands, and silty to clayey gravels and sands. These units are the result of numerous episodes of alluvial and glacial erosion and deposition. Types of depositional environments likely to have existed in the Libby area include braided stream, overbank, splay, point bar, till, moraine, outwash, loess (Aeolian), channel, and lacustrine. These environments moved in time and space, occurred contemporaneously, cancelled each other out (by erosion) and varied drastically in the level of energy and capacity to sort the available clastic material (Woodward-Clyde Consultants 1988).

Specifics regarding the depth to groundwater at OU1 and the formations underlying OU1 are unknown.

3.1.7 Demography and Land Use

Currently, the portion of land south of City Service Road is owned by the City of Libby and is undeveloped; however, a small section of the site is currently used by David Thompson Search and Rescue. In 2004, the search and rescue organization constructed a building containing a main office and a five-bay garage on the northwest portion of the site on the south side of City Service Road. The organization performs various types of search and rescue activities. The garage is used for storing search and rescue equipment and vehicles. Several other agencies, including local

and state law enforcement, also hold meetings in the main office. It is estimated that approximately 100 volunteers utilize this space on occasion throughout the year. It has been reported that the city stockpiles street sweepings and snow in this area as part of regular city maintenance activities. Access to this area is restricted by construction fencing, and EPA has provided guidance to the city regarding the use of caution when conducting any activities at the site that disturb soil. Permanent future redevelopment plans for this portion of OU1 are currently unknown.

The portion of land north of City Service Road is also currently owned by the city and serves a variety of recreational visitors. The main features of the park include two boat ramps, a pavilion, picnic tables, and a pumphouse. The newer of the two boat ramps is used by recreational boaters and commercial fishing outfitters; the older ramp is not commonly used due to swift current at its approach. The pumphouse (see Figure 1-3) houses a pump that draws non-potable water from the Kootenai River. The pump was installed jointly by the City of Libby and Lincoln County in 1999 to provide a backup water source to local fire departments. The pumphouse is accessed by city personnel in order to perform maintenance on the pump. The pump is connected to an external water spigot, which is used by the city to draw water for street sweeping and other maintenance operations, and other workers (such as employees of local fill pits and contractors working on EPA's removal program) to draw water primarily for use in dust suppression equipment (CDM 2007a).

3.2 Ecology

3.2.1 Terrestrial Animals

According to the United States Forest Service, the forested areas surrounding Libby have a great diversity of over 350 fish, mammals, birds, reptiles, and amphibians.

Even though there are a variety of animals present in the forested areas surrounding Libby, it is unlikely that many of these animals would be encountered at the site since the site is partially developed, inhabited by humans, and is located within the downtown core. Several of the terrestrial animals that have been encountered at the site include but are not limited to mule and white tail deer, red squirrels, and common garter snakes.

3.2.2 Terrestrial Plants

Libby and the surrounding area exhibit tree and grass plant species that are dominant within the Kootenai National Forest. Terrestrial plant species found at OU1 are dominated by common grass species.

3.2.3 Presence of Threatened, Endangered, and Protected Species

Even though there are endangered or threatened plants and animals that may be present in the forested areas surrounding Libby, it is unlikely that most would be encountered at the site.

Bald eagles have been seen in close proximity to OU1. Bald eagles were removed from the endangered and threatened species list in 2007, but are still a protected

species under the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act.

Section 4

Nature and Extent of Contamination

This section summarizes the current nature and extent of LA detected at OU1 and is organized to present results for each of the contaminated media of concern identified in the site-specific CSM detailed in Section 6. While Section 2 presents information on a large number of past removal and investigation activities, this section only presents data that represent the current status of the site.

4.1 LA in Indoor Air

As previously mentioned, there are only two buildings currently within the boundary of the site: the pump house in Area 2, and the search and rescue support building in Area 1. Only the search and rescue support building is consistently occupied. As discussed in Section 2.1.11.3, indoor ABS was conducted to estimate levels of LA encountered during human exposures. Of the 22 samples collected, LA was observed in 18 (81.8%) of the samples collected. Below is a summary of the concentrations of total LA observed and the frequency of LA detections for each scenario/area sample.

Summary of OU1 Search and Rescue Building Indoor ABS Air Sampling				
ABS Location	ABS Activity Type	Total Number of Samples Collected	Total Number of Samples with Detections of LA	Range of Total LA Concentrations (s/cc)
Garage	Active	16	12	ND to 0.0699
Meeting Room	Active	3	3	0.0011 to 0.0088
	Passive	3	3	0.0003 to 0.0079

Notes: OU1 – Operable Unit 1; ABS – activity-based sampling; LA – Libby amphibole; s/cc – structures per cubic centimeter; ND – non-detect

No additional data collection is required to assess this media specific to OU1. Conclusions regarding the risks associated with these observed concentrations are described in Section 6.

4.2 LA in Indoor Dust

This section presents results for the search and rescue support building only, because all other buildings on the site have been demolished and removed and the pumphouse is not consistently occupied.

As part of the indoor ABS activities, microvacuum dust samples were collected. A total of nine dust samples were collected from the building search and rescue support building, three each for the garage, meeting room, and response vehicles. Of the nine samples collected, LA was observed in two samples:

- EP-00106 collected in the garage area had a total LA loading of 20 s/cm²
- EP-00145 collected in the meeting room had a total LA loading of 75 s/cm²

Below is a summary of the concentrations of total LA observed and the frequency of LA detections in the 2007 indoor dust samples:

Summary of OU1 Indoor Dust Sampling			
Sample Location	Total Number of Samples Collected	Total Number of Samples with LA	Range of Total LA Concentrations (s/cm ²)
Garage	3	1	ND to 20
Meeting Room	3	1	ND to 75
Response Vehicles	3	0	ND

Notes: OU1 – Operable Unit 1; LA – Libby amphibole; s/cm² – structures per square centimeter; ND – non-detect

No additional data collection is required to assess this media specific to OU1. Conclusions regarding the risks associated with these observed concentrations are described in Section 6.

4.3 LA in Outdoor Air

Potential exposures to outdoor air at OU1 were estimated for ambient air and air near disturbed soil. This section summarizes the sample results for both of these exposure pathways specific to OU1.

4.3.1 LA in Outdoor Ambient Air

The specific outdoor ambient air sampling locations used to estimate the total LA concentrations in outdoor ambient air at OU1 are discussed in Section 2.3. The total LA concentration in outdoor ambient air has been observed at levels ranging from ND to 0.00016 s/cc in the four sample locations closest to OU1 (EPA 2009). Of 143 samples, LA was observed in 32 (22.4%) of the samples collected. Below is a summary of the concentrations of total LA observed and the frequency of LA detections for each of the four locations.

Summary of Ambient Air Sampling				
Sample Location		Total Number of Samples	Total Number of Samples with LA	Range of Total LA Concentrations (s/cc)
ID	Address			
L1	1915 Kootenai River	37	5	ND to 0.00016
L2	247 Indian Head Road	30	7	ND to 0.00012
L4	501 Mineral Ave	38	11	ND to 0.00012
L5	1427 Highway 37 N	38	9	ND to 0.000079
	J. Neils Park			

Notes: LA – Libby amphibole; s/cc – structures per cubic centimeter; ND – non-detect; Data summarized from Summary of Outdoor Ambient Air Monitoring for Asbestos at the Libby Asbestos Site, Libby, Montana (October 2006 to June 2008) (EPA 2009)

No additional data collection is required to assess this media specific to OU1. Conclusions regarding the risks associated with these observed concentrations are described in Section 6.

4.3.2 LA in Outdoor Air near Disturbed Soil

To estimate the potential exposures to LA in outdoor air near disturbed soil at OU1, eight personal air samples were collected as described in Section 2.1.11.4 during bush hogging activities. Most of the ground was wetted before bush hogging to suppress dust releases. Consequently, the amount of LA released may have been lower than if the disturbance had occurred when the ground was dry.

LA was observed in a total of six (75%) of the samples collected. Total LA concentrations ranged from ND to 0.0715 s/cc. Conclusions regarding the risks associated with these observed concentrations are described in Section 6.

4.4 LA in Soil

Surface and subsurface soil containing visible vermiculite and/or detectable levels of LA are present at OU1. The top portion of figure 4-1 illustrates the portions of Area 1 and Area 2 where contaminated soil has been removed, and also shows areas of residual contamination in subsurface soil. It should be noted that analytical results of confirmation soil samples collected within the excavated areas indicate LA is present at depth at concentrations equal to or below EPA's action level for soil, as detailed in Section 2. The bottom portion of Figure 4-1 also shows the results of the most recent surface soil sampling event conducted at the site (in 2007).

As discussed in Sections 2.1.11.1, 2.2.5 and 2.3.1, the LA concentration in current surface soil within OU1 is either ND, trace, or <1%. However visible vermiculite remains at the surface across the site. Vermiculite containing soil is present across the surface of the site for the following reasons:

- 1) Visible vermiculite in low levels was not a clean-up trigger at the time the removals were conducted

- 2) Site work conducted after the removal action was completed, has caused vermiculite containing soil previously existing in the subsurface to have been brought to the surface during excavation activities

Subsurface vermiculite containing soil remains at varying levels as a result of previous mining-related processes conducted at the site. Anecdotal information suggests that as much as 20 to 30 feet of fill material, some originating from the mine, was used to increase the elevation of OU1. Figure 4-1 (bottom portion) indicates locations where visible vermiculite has been observed and documented by field personnel; lack of such notation is not an indicator that vermiculite was not observed and/or is currently not present. Figure 4-1 (top portion) also indicates the location of orange snow fencing used as a visual indication at maximum excavation depths where vermiculite containing soil was encountered during removal activities conducted by EPA.

No additional data collection is required to assess this media specific to OU1. Conclusions regarding the risks associated with these observed concentrations are described in Section 6.

4.5 Summary

LA has been observed in all the media sampled at the site: indoor air, indoor dust, outdoor ambient air, outdoor air near disturbed soil, and surface and subsurface soil. The following table summarizes the observations of total LA concentrations for each media evaluated for OU1 that are most relevant to the current status of the site:

Summary of Post Removal LA Results Per Media Representing the Current Status of OU1				
Media	Total Number of Samples Collected	Total Number of Samples with Detections of LA	Percentage of Samples with LA Observed (%)	Range of LA Results
Indoor Air (Section 2.1.11.3)	22	18	81.8	ND to 0.0699 s/cc
Indoor Dust (Section 2.1.11.3)	9	2	22.2	ND to 75 s/cm ²
Outdoor Ambient Air* (Section 2.4)	143	32	22.4	ND to 0.00016 s/cc
Outdoor Air Near Disturbed Soil (Section 2.1.11.4)	8	6	75.0	ND to 0.0715 s/cc
Surface Soil** (Sections 2.1.11.1, 2.2.5, 2.3.1)	73	16	21.9	ND to <1%

Notes: LA – Libby amphibole; OU1 – Operable Unit 1; < - less than; % - percent; ND – non-detect; s/cc – structures per cubic centimeter; s/cm² – structures per square centimeter; * Data summarized from Summary of Outdoor Ambient Air Monitoring for Asbestos at the Libby Asbestos Site, Libby, Montana (October 2006 to June 2008) (EPA 2009); ** Soil result summary is for only PLM-VE results only

Key findings from OU1 sampling, as related to the present condition of the site, include the following (see Section 6 for further details regarding estimated risks associated with the observed levels):

- LA has been observed in indoor air and indoor dust samples at the search and rescue support building.
- LA has been observed in indoor air at the site collected during ABS activities within the garage and meeting room areas of the search and rescue support building.
- LA has been observed in outdoor ambient air samples collected near OU1.
- LA has been observed in personal air samples collected during bush hogging activities within the boundary of OU1.
- Current surface soil within the OU1 boundary contains LA at ND, trace, or <1% levels (Figure 4-1 – bottom portion).
- Current surface soil within the OU1 boundary contains visible vermiculite (Figure 4-1 – bottom portion).
- Subsurface soil is known to contain vermiculite, the exact location and depths of vermiculite containing soil are not fully documented or delineated.

Section 5

Contaminant Fate and Transport

Evaluation of fate and transport of vermiculite, vermiculite concentrate, and LA is based on results of site physical characteristics, source characteristics, and extent of contamination investigations. This section provides a discussion of the important factors involved in fate and transport of vermiculite, vermiculite concentrate, and LA at the site.

5.1 Contaminant Persistence and Transport

Information related to the persistence of LA structures in the environment is not fully understood or researched. Discussions in this section summarize the observations available for asbestos fibers in general where information specific to the persistence of LA in the environment does not exist.

Asbestos fibers are not volatile and are insoluble. Because of these characteristics asbestos fibers tend to settle out of air and water, and deposit in soil or sediment (EPA 1977, 1979 after ATSDR 2001a). However, it has been documented that small fibers can remain suspended in both air and water for long periods of time and be transported long distances (Jaenicke 1980 and EPA 1979 after ATSDR 2001a). The degradation of asbestos in the environment occurs slowly, if at all (NRC 1984 after ATSDR 2001a), and is thought to exist in the environment unchanged for long periods of time following release.

Once airborne, a number of factors (thickness, length, and static charge) influence how long an asbestos fiber will remain in the air. The most important factor is the thickness of the particle (EPA 2003). Most LA particles observed in air in Libby have a thickness in the range of 0.1 to 1.0 μm , with an average of around 0.4 μm . In air that is moving, asbestos particles of around 0.5 μm in thickness will typically fall out of the air and be re-deposited on surfaces with a “half time” of about 2 hours.

The half time is a measure of how long it takes for the concentration of a material to decrease by 50%. For example, if the starting concentration were 0.001 s/cc, and the half time were 2 hours, after 2 hours the concentration would be 0.0005 s/cc, after 4 hours the concentration would be 0.00025 s/cc, etc. Particles at the low end of the thickness range (closer to 0.1 μm) may remain suspended for significantly longer (half-time of about 40 hours), while fibers at the high end of the thickness range (closer to 1 micron) will tend to fall out more quickly (half time of about 30 minutes) (Baron 2004).

These calculated estimates of residence time in air are generally consistent with observations from field studies of asbestos residence time in air. For example, the Grace performed “drop tests” to see how much asbestos was in air at varying times after dropping some vermiculite on the ground. The results indicated that concentrations in air rose for about 5-10 minutes (this increase was probably due to the mixing effect), and then fell with a half time of about 30 minutes (Grace 1976). In

another case, Versar performed a series of studies for the EPA in which vermiculite insulation in attics was disturbed and asbestos concentrations in air were measured over time. Based on their data, Versar concluded that most asbestos fibers settle from attic air within about 24 hours (Versar 2003).

As long as an LA particle remains in air, it will tend to move in the same way that the air moves. This means that concentrations of LA will initially be highest at the point where the disturbance occurred, but will tend to decrease after time as the particles are moved about by air currents. In indoor air, the time that it takes for LA particles to mix in the air of a room depends on how much airflow there is, but mixing would usually be expected within about 5 to 30 minutes (Nazaroff 2005).

Coarse particles of asbestos and/or vermiculite can erode through physical processes such as weathering and/or crushing into smaller particles of asbestos and become airborne. Asbestos fibers and/or vermiculite are not known to migrate through soil, as such asbestos and/or vermiculite at depth do not pose an exposure risk to receptors at this site unless it becomes disturbed by intrusive human activities (i.e., underground utility installation and/or maintenance).

When a release occurs in outdoor air, the degree of mixing and transport will depend mainly on wind speed. If the air is completely calm, the concentration might remain elevated near the source for several hours. If the wind is blowing, the particles will tend to be rapidly dispersed away from the source of release.

The fate of asbestos and vermiculite in water follows the fate of most particles: fine particles can travel with the water phase for long distances; coarse particles tend to settle out and be transported with sediment.

Section 6

Baseline Human Health Risk Assessment

This section is a baseline human health risk assessment for OU1 of the Libby Site. The risk assessment uses available data to estimate the health risks to people who may breathe asbestos in air while working in or visiting OU1, either now or in the future, based on the conditions that currently exist within OU1. The methods used to evaluate human health risks from asbestos are in basic accord with EPA guidelines for evaluating risks at Superfund sites (EPA 1989), including recent guidance (EPA 2008) that has been specifically developed to support evaluations of exposure and risk from asbestos.

It is important to recognize that many people exposed to asbestos at OU1 likely will also be exposed to asbestos at other locations in and around Libby. While this risk assessment focuses exclusively on risks at OU1, the cumulative risks from exposure pathways that may occur in other OUs will be addressed in the future.

6.1 Background Information on Asbestos

6.1.1 Asbestos Mineralogy

Asbestos is the generic name for the fibrous habit of a broad family of naturally occurring poly-silicate minerals. Based on crystal structure, asbestos minerals are usually divided into two groups: serpentine and amphibole.

- **Serpentine:** The only asbestos mineral in the serpentine group is chrysotile. Chrysotile is the most widely used form of asbestos, accounting for about 90% of the asbestos used in commercial products (International Agency for Research on Cancer [IARC] 1977). There is no evidence that chrysotile occurs in the Libby vermiculite deposit, although it may be present in some types of building materials in Libby.
- **Amphiboles:** Five minerals in the amphibole group that occur in the asbestiform habit have found limited use in commercial products (IARC 1977), including:
 - actinolite
 - amosite
 - anthophyllite
 - crocidolite
 - tremolite

At the Libby site, the form of asbestos that is present in the vermiculite deposit is an amphibole asbestos that for many years was classified as tremolite/actinolite (e.g., McDonald et al 1986a, Amandus and Wheeler 1987). More recently, USGS performed electron probe micro-analysis and x-ray diffraction analysis of 30 samples obtained from asbestos veins at the mine (Meeker et al. 2003). Using mineralogical naming rules recommended by Leake et al. (1997), the results indicate that the asbestos at

Libby includes a number of related amphibole types. The most common forms are winchite and richterite, with lower levels of tremolite, actinolite, and magnesiorichterite. Because the mineralogical name changes that have occurred over the years do not alter the asbestos material that is present in Libby, and because EPA does not find that there are toxicological data to distinguish differences in toxicity among these different forms, the EPA does not believe that it is important to attempt to distinguish among these various amphibole types. Therefore, EPA simply refers to the mixture as LA.

6.1.2 Measurement Techniques for Asbestos in Air

In the past, the most common technique for measuring asbestos in air was PCM. In this technique, air is drawn through a filter and airborne particles become deposited on the face of the filter. All structures that have a length greater than 5 μm and have an aspect ratio (the ratio of length to width) of 3:1 or more are counted as PCM fibers. The limit of resolution of PCM is about 0.25 μm , so particles thinner than this are generally not observable.

A key limitation of PCM is that particle discrimination is based only on size and shape. Because of this, it is not possible to classify asbestos particles by mineral type, or even to distinguish between asbestos and non-asbestos particles. For this reason, nearly all samples of air collected in Libby are analyzed by TEM. This method operates at higher magnification (typically about 15,000 times) and hence is able to detect structures much smaller than can be seen by PCM. In addition, TEM instruments are fitted with accessories that allow each particle to be classified according to mineral type.

In some cases, it may be desirable to utilize results from a TEM analysis to estimate what would have been detected had the sample been analyzed by PCM. For convenience, particles detected under TEM that meet the rules for PCM are referred to as PCM-equivalent (PCME).

6.2 Basis for Concern

Vermiculite from the mine in Libby is contaminated with LA. Historic mining, milling, processing and transport of vermiculite at Libby are known to have caused releases of both vermiculite and LA to the environment. Inhalation of LA is known to have caused a range of adverse health effects in exposed humans, including workers at the mine and processing facilities (Lockey et al. 1984, Amandus and Wheeler 1987, McDonald et al. 1986a, McDonald et al. 2004, Sullivan 2007, Rohs et al. 2007), as well as residents of Libby (Peipins et al. 2003). Based on these adverse effects, EPA listed the Libby Asbestos Site on the National Priorities List in October 2002.

OU1 was contaminated with LA in a number of ways. When the area was occupied by the Export Plant: 1) substantial quantities of vermiculite were stockpiled and staged there in order to support shipment to other locations around the country; 2) exfoliation waste product (i.e., stoner rock) containing LA was buried there; and 3) smaller quantities of LA were possibly tested there for product development

purposes. As a consequence of the operations at the Export Plant, substantial quantities of vermiculite were lost or spilled and became mixed into the soil of OU1. Because the vermiculite and exfoliation waste product both contain LA, this substantially contaminated the soil with LA fibers. Data on the levels of contamination that have been observed in soils at OU1 are presented in Section 4.4.

6.3 Conceptual Site Model

Figure 6-1 presents the CSM for how humans may be exposed to LA at OU1. Key elements of the model are described below.

6.3.1 Contaminated Media

As noted above, when OU1 was occupied by the Export Plant, substantial quantities of vermiculite and LA became mixed into the soil. Although EPA has undertaken extensive cleanup activities at OU1 (including demolition of the former Export Plant buildings and other contaminated structures), as well as excavation and replacement of surface material at a number of locations across the OU, the surface soil remains contaminated with visible vermiculite in a number of locations (see Section 2.1.11.1 and Figure 2-5). In addition, vermiculite may remain buried at depth in some areas, which could serve as a source of release in the future if excavation activities brought contaminated material to the surface.

6.3.2 Land Use

Currently OU1 is owned by the City of Libby and is mainly undeveloped except for the David Thompson Search and Rescue Facility, boat launch facilities along the Kootenai River, and two public pavilions. The City has considered developing a large portion of OU1 into a public park.

6.3.3 Exposed Populations

Based on the current and potential future land use at OU1, people who are most likely to be exposed on a regular basis include:

- Volunteers who staff the David Thompson Search and Rescue Facility
- Fishing guides who launch fishing boats from the boat launch facility in OU1
- Local residents who visit OU1 for recreational purposes, either now or in the future (especially if it is converted by the City into a public park)
- City workers who perform maintenance activities at OU1, either now or in the future
- Potential future commercial workers (if the site is developed for commercial rather than recreational purposes)
- Potential future construction workers (if future development includes construction of new buildings or facilities)

Exposures of other people who visit OU1 on a less frequent basis (e.g., out of town visitors, fishermen who go on float trips originating at the boat launch ramp, etc.) would be less frequent and less extensive than the exposures for the populations described above.

6.3.4 Exposure Routes

People who visit or work at OU1 may be exposed to LA either by incidental ingestion of contaminated soil or by inhalation of air that contains LA fibers. Of these two pathways, inhalation exposure is considered to be of greatest concern. To the extent that incidental ingestion exposure of LA in soil may occur, the added risk from this pathway is expected to be small compared to the risk from the inhalation pathway.

6.3.5 Exposure Pathways

LA fibers may become airborne in a number of ways. This may include natural forces such as wind blowing over a contaminated soil, or human activities such as sweeping up dust indoors or mowing, raking, or digging in areas of contaminated outdoor soil. The amount of LA in air, and hence the amount inhaled, will vary depending on the level of LA in the source and also on the intensity and duration of the disturbing force.

For the purposes of exposure assessment, it is convenient to stratify inhalation exposures according to source material (e.g., outdoor soil, indoor dust) and according to activity (e.g., active disturbance vs. passive behavior). Based on this approach, the exposures of chief concern for each of the exposed populations are as follows:

- Volunteers at the David Thompson Search and Rescue Facility may be exposed both while inside the facility and while working outside in the vicinity of the building. At both locations, exposures may occur during both active and passive behaviors.
- Fishing guides who launch boats from the boat launch ramp are expected to be exposed only outdoors. Because the boat ramp is paved, exposures from soil disturbance are likely to be low, but could occur as a result of disturbing dust from OU1 that has fallen onto the ramp. Likewise, fishing guides might be exposed by disturbing soil when parking their vehicles in non-paved areas.
- Current or future recreational visitors to OU1 (park visitors) are also assumed to be exposed only outdoors. It is assumed that park visitors might engage in a wide variety of different types of behaviors, ranging from passive (e.g., sitting at a picnic table) to active (e.g., playing sports, a child digging in the soil).
- City maintenance workers are assumed to engage in a variety of activities at OU1, the most common of which would be lawn care and repair or maintenance of facilities. This might include occasional work inside the David Thompson building or in the pump house, but because neither building contains vermiculite insulation and because such indoor exposures are likely to be infrequent, any indoor

exposures are likely to be a minor source of exposure compared to exposures that occur outdoors while maintaining the park. Consequently, these potential indoor exposures are not evaluated quantitatively for the maintenance worker.

- Potential future commercial workers are assumed to be exposed mainly outdoors in areas of contaminated soil, since any newly constructed buildings would not contain vermiculite or LA. However, exposure could also occur inside if the interior of the workplace became contaminated by track-in of contaminated outdoor soil.
- Potential future construction workers are likely to be exposed to LA in outdoor air as a consequence of activities such as soil grading and excavation that could disturb both the surface and the subsurface soils.

Note that all individuals who visit the OU by car might be exposed by transfer of contaminated soil from the OU into the car, followed by subsequent inhalation exposure while driving. The significance of this exposure pathway is currently unknown, but may be investigated in the future to support evaluation of cumulative Libby Site-wide risk.

6.4 Toxicity Assessment

The adverse effects of asbestos exposure in humans have been the subject of a large number of studies and publications. The following section is intended to provide a brief overview of the main types of adverse health effects that have been observed in humans. More detailed reviews of the literature are provided in IARC (1977), World Health Organization (WHO) (2000), and ATSDR (2001, 2004).

6.4.1 Non-Cancer Effects

6.4.1.1 Asbestosis

Asbestosis is a chronic pneumoconiosis associated with inhalation exposure to asbestos. It is characterized by the gradual formation of scar tissue in the lung parenchyma. Initially the scarring may be minor and localized within the basal areas, but as the disease develops, the lungs may develop extensive diffuse alveolar and interstitial fibrosis (American Thoracic Society 1986).

Build-up of scar tissue in the lung parenchyma results in a loss of normal elasticity in the lung which can lead to the progressive loss of lung function. The initial symptoms of asbestosis are shortness of breath, particularly during exertion. People with fully developed asbestosis tend to have increased difficulty breathing that is often accompanied by coughing or rales. In severe cases, impaired respiratory function can lead to death.

Asbestosis generally takes a long time to develop, with a latency period from 10 to 20 years. Mossman and Churg (1998) suggest that latency is inversely proportional to exposure level. The disease may continue to progress long after exposure has ceased

(ATSDR 2001). The progression of the disease after cessation of exposure also appears to be related to the level and duration of exposure (American Thoracic Society 2004).

6.4.1.2 Pleural Abnormalities

Exposure to asbestos may induce several types of abnormality in the pleura (the membrane surrounding the lungs).

- Pleural effusions are areas where excess fluid accumulates in the pleural space. Most pleural effusions last several months, although they may be recurrent.
- Pleural plaques are acellular collagenous deposits, often with calcification. Pleural plaques are the most common manifestations of asbestos exposure (ATSDR 2001, American Thoracic Society 2004).
- Diffuse pleural thickening is a noncircumscribed fibrous thickening of the visceral pleura with areas of adherence to the parietal pleura. Diffuse thickening may be extensive and cover a whole lobe or even an entire lung. Infolding of thickened visceral pleura may result in collapse of the intervening lung parenchyma (rounded atelectasis). Gevenois et al. (1998) and Schwartz et al. (1991) report that diffuse pleural thickening may occur as a result of pleural effusions.

Pleural effusions and plaques are generally asymptomatic, although rarely they may be associated with decreased ventilatory capacity, fever, and pain (e.g., Bourbeau et al. 1990). Diffuse pleural thickening can cause decreased ventilatory capacity (Baker et al. 1985, Churg 1986, Jarvholm and Larsson 1988). Severe effects are rare, although Miller et al. (1983) reported on severe cases of pleural thickening that led to death.

The latency period for pleural abnormalities is usually about 10 to 40 years (American Thoracic Society 2004), although pleural effusions may occasionally develop as early as one year after first exposure (Epler and Gaensler 1982).

6.4.1.3 Other Non-Cancer Effects

Some epidemiological studies provide evidence that chronic exposure to asbestos can increase the risk of several other types of non-cancer effects including cor pulmonale (right-sided heart failure), retroperitoneal fibrosis (a fibrous mass in the back of the abdomen that blocks the flow of urine from the kidneys to the bladder), depressed cell-mediated immunity (ATSDR 2001), and autoimmune disease (Pfau et al. 2005, Noonan et al. 2006).

6.4.1.4 Observations of Asbestos-Related Non-Cancer Diseases in People Exposed to LA

Non-Malignant Respiratory Disease (NMRD)

Amandus and Wheeler (1987), McDonald et al. (1986a, 2004), and Sullivan (2007) studied the cause of death in workers exposed to LA while working at the vermiculite mine and mill at Libby. Each of these researchers reported that Libby workers were more likely to die of NMRD (i.e., asbestosis, chronic obstructive pulmonary disease,

pneumonia, tuberculosis and emphysema) compared to the general U.S. population (white males), supporting the conclusion that exposure to LA increases risk of non-malignant lung disease.

Pleural Abnormalities

Armstrong et al. (1988), McDonald et al. (1986b) and Amandus et al. (1987) evaluated the prevalence of chest radiographic changes in workers exposed to LA while working at the vermiculite mine and mill at Libby. These researchers observed increased prevalence in pleural changes, including pleural calcification, pleural thickening and profusion of small opacities among exposed workers. Rohs et al. (2007) studied the prevalence of pleural changes in the lungs of workers exposed to LA while working at a facility in Marysville, Ohio expanding Libby vermiculite for use as an inert carrier for lawn care products. Rohs et al. (2007) observed an increased incidence of pleural plaques, diffuse pleural thickening and interstitial changes (irregular opacities) in exposed workers. In addition, studies by Peipins et al. (2003), Muravov et al. (2005), and Whitehouse (2004) also observed increased incidence in pleural abnormalities of not only workers, but also household contacts of former employees of the Libby mine and residents of Libby, MT environmentally exposed to LA. These findings support the conclusion that exposure to LA can induce pleural abnormalities.

6.4.2 Cancer Effects

Many epidemiological studies have reported increased mortality from cancer in asbestos workers, especially from lung cancer and mesothelioma. Based on these findings, and supported by extensive carcinogenicity data from animal studies, EPA has classified asbestos as a known human carcinogen (EPA 1993b).

6.4.2.1 Lung Cancer

Exposure to asbestos is associated with increased risk of developing all major histological types of lung carcinoma (adenocarcinoma, squamous cell carcinoma, and oat-cell carcinoma) (ATSDR 2001). The latency period for lung cancer generally ranges from about 10 to 40 years (ATSDR 2001). Early stages are generally asymptomatic, but as the disease develops, patients may experience coughing, shortness of breath, fatigue, and chest pain. Most lung cancer cases result in death. The risk of developing lung cancer from asbestos exposure is substantially higher in smokers than in non-smokers (Selikoff et al. 1968, Doll and Peto 1985, ATSDR 2001b, National Toxicology Program [NTP] 2005).

6.4.2.2 Mesothelioma

Mesothelioma is a tumor of the thin membrane that covers and protects the internal organs of the body including the lungs and chest cavity (pleura), and the abdominal cavity (peritoneum). Exposure to asbestos is associated with increased risk of developing mesothelioma (ATSDR 2001). The latency period for mesothelioma is typically around 20-40 years (Lanphear and Buncher 1992, ATSDR 2001b, Mossman et

al. 1996, Weill et al. 2004). By the time symptoms appear, the disease is most often rapidly fatal (British Thoracic Society 2001).

6.4.2.3 Other Cancers

Gastrointestinal Cancer

A number of studies suggest asbestos exposure may increase risk of cancer at various gastrointestinal sites (EPA 1986). The National Academy of Science [NAS] (2006) reviewed evidence regarding the role of asbestos in gastrointestinal cancers primarily following occupational exposures (these are assumed to be primarily by the inhalation route). NAS concluded that data are “suggestive but insufficient” to establish that asbestos exposure causes stomach or colorectal cancer. Data on esophageal cancer are mixed and were regarded as “inadequate to infer the presence or absence of a causal relationship to asbestos exposure”.

Data on risks of gastrointestinal cancer following ingestion-only exposure are more limited. Some researchers (e.g., Conforti et al. 1981, Kjaerheim et al. 2005) have reported a significant correlation between oral exposure to asbestos in drinking water and the risk of gastrointestinal cancer. However, WHO (1996) concluded that data are not adequate to support the hypothesis that an increased cancer risk is associated with the ingestion of asbestos in drinking water.

Laryngeal and Pharyngeal Cancer

NAS (2006) reviewed available data on the relationship between asbestos exposure and laryngeal cancer and concluded that the data were “sufficient to infer a causal relationship between asbestos and laryngeal cancer.” NAS (2006) concluded that data are “suggestive but not sufficient to infer a causal relationship between asbestos exposure and pharyngeal cancer.”

Renal Cancer

Excess deaths from kidney cancer among persons with known exposure to asbestos have been reported by a number of researchers (e.g., Selikoff et al. 1979, Enterline et al. 1987, Puntoni et al. 1979). A review by Smith et al. (1989) evaluated these studies and concluded that asbestos should be regarded as a probable cause of human kidney cancer.

6.4.2.4 Observations of Asbestos-Related Cancer Cases in Workers in Libby

Amandus and Wheeler (1987), Amandus et al. (1987), McDonald et al. (1986a, 2004), and Sullivan (2007) studied the cause of death in workers exposed to LA while working at the vermiculite mine and mill at Libby. All of these groups of researchers reported an increased incidence of lung cancer and mesothelioma in exposed workers, strongly supporting the conclusion that LA can cause increased risk of respiratory cancer when inhaled.

6.5 Quantification of Exposure and Risk

6.5.1 Basic Equations

6.5.1.1 Non-Cancer Risk

The risk of a non-cancer effect from inhalation exposure to asbestos is usually described in terms of a hazard quotient (HQ), which is defined as the ratio of the cumulative exposure level (s/cc-yrs) attributable to the site divided by an exposure level (the reference concentration, or RfC) that is believed to be without significant risk of adverse non-cancer effects:

$$HQ = CE / RfC$$

where:

$$\begin{aligned} CE &= \text{Cumulative exposure (PCME s/cc-yrs)} \\ RfC &= \text{Reference concentration (PCME s/cc-yrs)} \end{aligned}$$

At present, the EPA is working to develop an RfC for inhalation exposure to LA, but this value is still under development and is not yet available for use in estimation of HQ values. Therefore, no quantitative evaluation of non-cancer risk is included in this risk assessment. However, as discussed above in Section 6.3.1, studies in Libby reveal that the incidence of asbestos-related non-cancer effects, including pleural calcification, pleural thickening and opacities, are increased in workers and residents (Armstrong et al. 1988, McDonald et al. 1986, Amandus et al. 1987b, Peipins et al. 2003, Muravov et al. 2005, Whitehouse 2004). These findings emphasize that, despite the inability to provide a quantitative HQ calculation at present, occurrence of non-cancer effects are a significant human health concern in the community.

6.5.1.2 Cancer Risk

Excess lifetime risk of cancer (lung cancer plus mesothelioma) from exposure to asbestos in air is related to the amount of asbestos inhaled and the age when exposure occurs. The basic equation is (EPA 2008):

$$\text{Risk} = EPC \cdot TWF \cdot IUR_{a,d}$$

where:

$$\begin{aligned} \text{Risk} &= \text{Lifetime excess risk of dying from cancer (lung cancer or mesothelioma) as a consequence of the site-related asbestos exposure} \\ EPC &= \text{Exposure point concentration of asbestos in air (PCM s/cc)} \\ TWF &= \text{Time weighting factor} \\ IUR_{a,d} &= \text{Inhalation unit risk (PCM s/cc)}^{-1} \text{ for an exposure that begins at age "a" and lasts for duration "d" years} \end{aligned}$$

The level of cancer risk that is of concern is a matter of personal, community, and regulatory judgment. In general, the EPA considers excess cancer risks that are below about 1E-06 to be so small as to be negligible, and risks above 1E-04 to be sufficiently large that some sort of remediation is desirable. Excess cancer risks that range between 1E-04 and 1E-06 are generally considered to be acceptable (EPA 1991b), although this is evaluated on a case by case basis, and EPA may determine that risks lower than 1E-04 are not sufficiently protective and warrant remedial action. Note that risk management decisions generally consider the sum of all the risks contributed by differing exposure scenarios into account, rather than simply evaluating each one independently.

6.5.2 Data Sources

6.5.2.1 Exposure Point Concentration (EPC)

The value of EPC is based on measurements of asbestos concentration levels in air (expressed as PCM or PCME s/cc) at the location of concern and for the exposure scenario of concern. Ideally, the EPC would be the true average concentration value¹, averaged across the exposure duration “d”. However, the true average concentration can only be approximated from a finite set of measurements, and the sample mean might be either higher or lower than the true mean. In order to minimize the chances of underestimating the true level of exposure and risk, EPA generally recommends that risk calculations be based on the 95% upper confidence limit (95UCL) of the sample mean (EPA 1992), and has developed a software application (ProUCL) to assist with the calculation of UCL values (EPA 2007). However, the equations and functions in ProUCL were not designed to work well for asbestos data sets, and application of ProUCL to asbestos data sets is not recommended. EPA is presently working to develop a new software application that will be appropriate for use with asbestos data sets, but the application is not yet available for use. In the interim, because the 95UCL cannot yet be calculated with confidence, risk calculations in the assessment will be based both on the sample mean and the maximum value. The risk estimate based on the sample mean is the best estimate of risk, and the value based on the maximum concentration is considered to be an upper bound.

6.5.2.2 Time Weighting Factor (TWF)

The value of TWF ranges from zero to one, and describes the average fraction of full time that exposure occurs in the time interval being evaluated. The general equation is (EPA 2008):

$$TWF = ET/24 \cdot EF/365$$

¹ For analytes other than asbestos, EPA suggests that, when computing the mean of a set of samples, “non-detects” (i.e., samples with concentrations below the detection limit of the analytical instrument) be evaluated by assigning a surrogate value of ½ the detection limit (EPA 1989). By analogy, it is sometimes supposed that “non-detects” for asbestos (i.e., samples where the observed count is zero) should be evaluated by assigning a value equal to ½ the analytical sensitivity. However, this is not correct, and use of ½ the sensitivity as a surrogate for samples with a count of zero may lead to a substantial overestimate of the true mean of a group of samples. Rather, the mean of a set of microscopy sample results is computed by treating “non-detects” as zero.

where:

ET = Average exposure time (hrs/day) on days when exposure is occurring
 EF = Average exposure frequency (days/year) in years when exposure is occurring

For example, if a person were exposed to asbestos 10 hours per day for 200 days per year, the value of TWF would be:

$$\text{TWF} = 10/24 \cdot 200/365 = 0.228$$

Not all individuals within a group will have equal values for ET and EF. To account for this variability in exposure between different individuals, EPA focuses on individuals who have central tendency exposures (CTE) and on those who have reasonable maximum exposures (RME).

Data on ET (hours/day) and EF (days/year) were obtained by questionnaire for individuals who are currently exposed at OU1, including 18 volunteers at the Search and Rescue facility, 8 fishing guides, and one City maintenance worker. The detailed results of the survey are provided in Appendix I, and summary statistics for rescue volunteers (N = 18) and fishing guides (N = 8) are presented in Table 6-1. Because a response was obtained for only one City maintenance worker, and because the duties and exposure parameters of a maintenance worker are likely to change if the site is converted into a public park or a commercial building development, exposure parameters for this worker were based on professional judgment, as were parameters for current and future recreational visitors. These judgment-based parameters are shown in Table 6-2.

6.5.2.3 Inhalation Unit Risk (IUR_{a,d})

Values of IUR_{a,d} for a wide range of values for “a” (age at first exposure) and “d” (exposure duration) are given in EPA (2008). This document also gives an equation for computing IUR_{a,d} for any combination of “a” and “d” that are not included in EPA (2008). Values of IUR for the exposure scenarios of concern in this risk assessment are shown in Table 6-1 and Table 6-2.

6.5.3 Evaluation of Risks from Breathing Ambient Outdoor Air

6.5.3.1 Concentration Values in Outdoor Ambient Air

All people who visit or work at OU1 will be exposed by breathing outdoor ambient air (outdoor air that is not impacted by personal activities that disturb LA in outdoor soil). Although an outdoor ambient air monitoring program has not been performed specifically within the boundary of OU1, EPA has performed an extensive study of outdoor ambient air in Libby, using 14 different monitoring stations distributed throughout the community. The results of this study are presented in EPA (2009), and the concentration values are summarized in Table 6-3. Because OU1 is located in

the North section of Libby (see EPA 2009, Figure 2-1), the data for this area are considered to be appropriate for use at OU1:

$$\begin{aligned}\text{EPC}(\text{mean}) &= 7.0\text{E-}06 \text{ PCME s/cc} \\ \text{EPC}(\text{max}) &= 1.1\text{E-}04 \text{ PCME s/cc}\end{aligned}$$

6.5.3.2 Exposure and Risk Calculations

Table 6-4 presents excess cancer risk estimates for people exposed to outdoor ambient air while present in OU1. As indicated, based on the best estimate of the mean concentration, estimated cancer risk levels range from $4\text{E-}10$ to $3\text{E-}08$, while upper bound estimates based on the maximum detected concentration range from $6\text{E-}09$ to $4\text{E-}07$. All of these values are well below EPA's risk range of $1\text{E-}04$ to $1\text{E-}06$, indicating that inhalation exposure to outdoor ambient air is not of significant concern for workers or visitors in OU1.

6.5.4 Evaluation of Risks from Indoor Exposure

6.5.4.1 Concentration Values in Indoor Air

The only building that presently exists at OU1 that is regularly occupied by humans is the Search and Rescue building. As discussed in Section 2.1.11.3 and Section 4.1, indoor air personal air samples were collected at this building to evaluate three exposure scenarios:

- Active behaviors in the garage area
- Active behaviors in the meeting room area
- Passive behaviors in the meeting room area.

Table 6-5 summarizes the results, stratified by activity level.

6.5.4.2 Exposure and Risk Calculations

Table 6-6 presents excess cancer risk estimates for people exposed to indoor air at the search and rescue building. As indicated, based on the best estimate of the mean, estimated cancer risk levels range from $8\text{E-}07$ (CTE) to $1\text{E-}05$ (RME). Based on the maximum detected concentrations, estimated cancer risk levels range from $4\text{E-}06$ (CTE) to $9\text{E-}05$ (RME). In both cases, most of the risk is associated with active behaviors, with relatively little coming from passive indoor activities.

These risk estimates are all within or below EPA's risk range, indicating that indoor exposures at the search and rescue building, taken alone, are of relatively low concern. However, as noted earlier, the same individual may be exposed both inside and outside the building in OU1, and also in other parts of Libby, so the risks from inside the building must be considered along with other exposures that contribute to the total (cumulative) risk to an individual.

6.5.5 Evaluation of Risks from Disturbing Outdoor Soil

6.5.5.1 Air Concentrations Under Current Site Conditions

Measuring the concentration of asbestos in air in association with a specific activity that disturbs soil is referred to as activity-based sampling (ABS). Only one data set is available on the concentration of LA in ABS air samples near disturbed soils in OU1. As discussed in Section 2.1.11.4 and Section 4.3.2, this data set consists of 8 personal air samples collected by an individual who was mowing ("brush hogging") in Area 1 to prepare for an inspection of soil for visible vermiculite contamination. The ABS data from this event are summarized in Table 6-7. Although limited, these data are used here as the basis for estimation of human exposure from soil disturbances in OU1.

Because the ABS data from OU1 are limited, EPA considered using a more extensive ABS data set that has been collected at residential properties in OU4. However, no clear relationship has been established between ABS air values and the levels of LA in the soil, so reliable extrapolation of data from OU4 to OU1 is not possible. Consequently, it is unknown whether ABS data from OU1 would likely be similar to, higher than, or lower than the values observed in studies in OU4. Based on this, the data from OU4 were not used in this risk assessment.

6.5.5.2 Exposure and Risk Calculations

Table 6-8 presents excess cancer risk estimates for people exposed to air in the vicinity of active soil disturbances in OU1. As indicated, based on the best estimate of the mean concentration, estimated cancer risk levels range from 1E-06 to 1E-04. Based on the maximum detected concentration, estimated cancer risk levels range from 6E-06 to 8E-04. These values are within and above EPA's risk range of 1E-06 to 1E-04, indicating that exposures via soil disturbance activities may be of concern for some receptors.

It is important to recognize that the OU1 ABS data have a number of potential limitations that limit confidence in the exposure and risk calculations presented above. Specifically, the data may tend to underestimate exposure and risk because:

- Most of the ground was wetted before mowing to suppress dust releases. Consequently, the amount of LA released may have been lower than if the disturbance had occurred when the ground was dry.
- Based on visual inspection, the levels of vermiculite in the area mowed are not as high as at some other locations in OU1. Consequently, similar soil disturbances in other areas may tend to release higher levels of LA.
- The number of samples collected (N = 8) may not be large enough to capture the full range of variability in airborne releases during mowing or other soil

disturbance activities, potentially leading to an underestimate of the mean air concentration that a worker might be exposed to.

Because of these limitations, the risk estimates presented in Table 6-8 should be considered uncertain, and actual risks may be higher.

6.5.5.3 Consideration of Future Site Conditions

Even if it were possible to characterize cancer risks to people from exposures to OU1 soil under current site conditions, EPA is also concerned about potential future risks from soil disturbances at OU1. This is because several lines of information suggest that the subsurface soils at OU1 may contain substantial quantities of residual vermiculite that were released when the Export Plant was operating on the OU. This includes the following:

- Former workers at the Export Plant report that vermiculite was present in fill material used to level the area of the OU.
- Cleanup activities completed to date at OU1 have identified substantial levels of buried vermiculite at some locations, including the north face of the OU along the Kootenai River and along the berms to Highway 37 near the eastern end of the OU (CDM 2007b). Vermiculite in these areas has been observed as layers; it is suspected these layers are the result of material that was stockpiled during the operation of the export plant being used to fill in low lying areas of the OU.
- Installation of a water pipeline in OU1 by the City resulted in buried vermiculite being brought to the surface. During this excavation, vermiculite was observed at depths ranging from 10 to 36 inches below ground surface. Samples collected of the material indicated LA concentrations in the vermiculite were as high as 3% (CDM 2007b).
- Installation of a new phone line across OU1 by a utility company also resulted in buried vermiculite being brought to the surface. During this excavation, vermiculite was observed at a depth of 24 inches below ground surface (CDM 2007b).

This information indicates that buried vermiculite at OU1 could serve as a potential source of release and re-contamination of surface soils with LA under circumstances in which subsurface soils might become exposed. This could result from natural weathering and erosion at the OU, children or workers digging in the dirt, as well as a range of potential future construction activities that involve soil excavation or earthwork.

6.6 Uncertainties

There are a number of uncertainties that limit confidence in the estimated risks of cancer in people who may visit or work at OU1. The principal sources of this uncertainty are discussed below.

6.6.1 Uncertainty in LA Concentrations in Inhaled Air

Concentrations of LA in air are inherently variable, so estimates of mean exposure concentrations are subject to uncertainty arising from random variation between individual samples. This problem is especially marked for outdoor ABS samples, where very wide variability (3 -4 orders of magnitude) may be observed within and between data sets. This high variability means that it is usually necessary to collect a large number of samples to ensure that the data are representative. However, as noted above, at this OU, only 8 ABS values are available, and these values may not be representative of the true long term average exposure concentration for soil disturbances in the OU. Consequently, the mean is quite uncertain, and may be low.

This uncertainty is further compounded by the effect of analytical measurement error. That is, for each air sample collected, the measured concentration value is a random variable that is characterized by the Poisson distribution:

$$C_{\text{observed}} \sim \text{POISSON}(C_{\text{true}} \cdot \text{Volume analyzed}) / \text{Volume Analyzed}$$

As a consequence, the variability (and hence uncertainty) in the measured concentration values is greater than the variability due to sampling variation alone. Consequently, risks calculated based on the mean may be either higher or lower than the true risk, but the magnitude of the potential error cannot be estimated at present.

6.6.2 Lack of an Approved Non-Cancer RfC

As noted above, EPA has not yet developed national guidance for evaluating the risk of non-cancer effects from inhalation exposure to asbestos. For most chemicals that cause both cancer and non-cancer effects, it is usually true that unacceptable risks from cancer occur at lower environmental exposure levels than unacceptable risks of non-cancer effects. In this case, if action is taken to protect humans from unacceptable cancer risk, concern over non-cancer risk is generally low. Consequently, in this situation, absence of a reliable RfC might have little effect on risk management decision-making. However, this may not be the case for LA. Studies of former workers and area residents (Armstrong et al. 1988, McDonald et al. 1986a, Amandus et al. 1987, Peipins et al. 2003, Muravov et al. 2005, Whitehouse 2004) provide strong evidence that exposure to LA results in an increased incidence of non-cancer adverse effects, and that these effects occur in some individuals who appear to have had only low exposure. Thus, it should not be presumed that cancer risk is the "risk driver" at Libby OU1 or other parts of the Libby Site.

6.6.3 Uncertainty in the Cancer Exposure-Response Relationship

Available data from studies in both animals and humans suggest that the risk of cancer from inhalation exposure to asbestos may depend in part on the type of asbestos (chrysotile vs. amphibole) and on the dimensions (length and width) of the inhaled fibers. Evaluations performed to date suggest that amphibole asbestos is

somewhat more potent than chrysotile (e.g., Hodgson and Darnton 2000, Berman and Crump 2008a, 2008b), although quantification of the difference remains difficult. Because the current EPA method for estimating cancer risk utilizes data from both chrysotile studies and amphibole studies and does not differentiate between the mineral forms, the potency estimates based on the current EPA method may be somewhat low for use at a site such as OU1 where exposure is to amphibole asbestos only. If so, risk estimates based on this method may tend to be somewhat low at OU1.

It is also important to note that the current EPA method for estimating cancer risk is based on the best estimate of the cancer potency factors for lung cancer and mesothelioma, and that the true value of the potency factors might be up to 10-times higher or lower than the best estimates (EPA 1986). Consequently, true risks might be up to 10 times higher or lower than the values reported here.

6.6.4 Uncertainty in Human Exposure Patterns

Risk from asbestos is strongly dependent not only on the level of exposure, but also on the frequency of exposure and on the age when exposure begins and ends. Reliable data on the human exposure parameters are available for two of the populations evaluated (rescue volunteers and fishing guides), but site-specific data are not presently available for other receptor groups, including recreational visitors, maintenance workers, commercial workers, or construction workers. The exposure parameters selected for use in the calculation of risks for these populations were selected using professional judgment, with the intention of selecting values that are more likely to be high than low. However, true values are uncertain, and a survey of current or future park visitors and workers would be needed to derive more accurate and reliable values.

6.6.5 Uncertainty from Uncharacterized Waste Material

One of the main concerns at OU1 is the presence of residual vermiculite in subsurface soil. Although current data (reviewed above) are sufficient to indicate that buried vermiculite is present, data are not sufficient to identify the locations, depths, and concentration levels that are present. Because buried vermiculite might be present at nearly any location, a very extensive sampling program would be needed to fully characterize the spatial (lateral and vertical) distribution of vermiculite and LA in subsurface soils at OU1.

The occurrence of buried vermiculite and associated LA contamination is of concern because this could serve as a potential source of release and re-contamination of surface soils under any circumstance in which subsurface soils might become exposed. This could result from natural weathering and erosion at the site, children or workers digging in the dirt, as well as a range of potential future construction activities that involve soil excavation or earthwork. Thus, regardless of the

confidence in the estimated risks to humans based on current site conditions, substantial concern exists for potential future risks that could result from exposure to LA-contaminated vermiculite wastes that are presently buried.

6.7 Summary

Methods for quantification of cancer and non-cancer risk from inhalation exposure to asbestos are still under development. However, risk predictions that are based on the best methods and data that are currently available indicate the following:

- Estimated excess cancer risks from inhalation exposure to outdoor ambient air at OU1 are all well below EPA's risk range of $1\text{E-}04$ to $1\text{E-}06$. Based on this, exposure to outdoor ambient air in OU1 is unlikely to be of significant health concern to any human receptor.
- Estimated excess cancer risks to volunteers who work indoors at the David Thompson Search and Rescue facility range are below or within EPA's risk range. Based on this, exposure to indoor air, taken alone, is likely to be of low concern. However, volunteers in the building may be exposed to LA by other pathways, and so risk evaluations must consider the total risk.
- Estimated cancer risks from inhalation of LA caused by disturbance of soils at OU1 are difficult to quantify with confidence, but it seems likely that risks to individuals who repeatedly disturb soil in OU1 may approach or exceed EPA's risk range. Based on this, this pathway is considered to be of potential concern.
- Subsurface soils at OU1 contain buried vermiculite. In the future, if this buried vermiculite became exposed (e.g., because of soil erosion or soil excavation activities), excess cancer risks from soil disturbance might be substantially higher than under current conditions.
- Non-cancer risks from inhalation exposure to LA cannot be quantified at present, but it is anticipated that non-cancer risks may be of similar or possibly even greater concern than cancer risks.

Section 7

Summary and Conclusions

7.1 Summary

7.1.1 Investigation Findings and Observations

OU1 was historically owned and used by Grace for stockpiling, staging, and distributing vermiculite and vermiculite concentrate to vermiculite processing areas and insulation distributors outside of Libby. As result of these operations, the site was contaminated with LA contained within the vermiculite and vermiculite concentrate. Because of the LA contamination present at the site it became necessary for EPA to conduct various investigation activities to determine the nature and extent of LA contamination at the site. Through these investigations it became evident that removal actions would be required to remove LA source material present at the site to reduce exposures to LA.

Removal actions at the site conducted between October 2002 and October 2003 removed all historical buildings from the site and all surface soil with LA concentrations greater than or equal to 1%. Subsequent post removal investigations conducted in 2007 have indicated LA continues to be present at the site in indoor air, indoor dust, outdoor air, and surface soil as indicated in the following table:

Summary of Post Removal LA Results Per Media Representing the Current Status of OU1				
Media	Total Number of Samples Collected	Total Number of Samples with LA	Percentage of Samples with LA Observed (%)	Range of LA Results
Indoor Air	22	18	81.8	ND to 0.0699 s/cc
Indoor Dust	9	2	22.2	ND to 75 s/cm ²
Outdoor Ambient Air*	143	32	22.4	ND to 0.00016 s/cc
Outdoor Air Near Disturbed Soil	8	6	75.0	ND to 0.0715 s/cc
Soil (surface)**	73	16	21.7	ND to <1%

Notes: LA – Libby amphibole; OU1 – Operable Unit 1; % – percent; ND – non-detect; s/cc – structures per cubic centimeter; s/cm² – structures per square centimeter; < – less than; * Data summarized from Summary of Outdoor Ambient Air Monitoring for Asbestos at the Libby Asbestos Site, Libby, Montana (October 2006 to June 2008) (EPA 2009); ** Based on PLM-VE results only

7.1.2 Risk Assessment Summary

Risk predictions, specific to OU1, that are based on the best methods and data that are currently available are summarized in the following table:

Summary of Post Removal Estimate Risk Levels for Media of Concern at OU1		
Media	Estimate of Mean Concentration	Estimate of Maximum Detected Concentration*
Indoor Air	8E-07 (CTE) to 1E-05 (RME)	4E-06 (CTE) to 9E-05 (RME)
Outdoor Ambient Air	4E-10 to 3E-08	6E-09 to 4E-07
Outdoor Air Near Disturbed Soil	1E-06 to 1E-04	6E-06 to 8E-04

Notes: CTE - central tendency exposure; RME - reasonable maximum exposure; *shading represents risks that are above EPA's acceptable risk range

7.2 Conclusions

Based on the information currently available and presented in this RI, the following conclusions have been drawn regarding OU1:

- Vermiculite and LA has been observed in surface soil at the site. Vermiculite and LA will continue to exist in surface soil at the site if no remedial actions are taken.
- Subsurface soils at OU1 contain vermiculite. Excess cancer risks from subsurface soil disturbance might be substantially higher than under current conditions if this buried vermiculite became exposed. Remedial actions are required to reduce or prevent exposures to these subsurface soils.
- Estimated excess cancer risks from inhalation exposure to outdoor ambient air at OU1 are all well below EPA's risk range of 1E-04 to 1E-06 and exposure to outdoor ambient air in OU1 is unlikely to be of significant health concern to any receptor.
- Estimated excess cancer risks to volunteers who work indoors at the David Thompson Search and Rescue facility range are below or within EPA's risk range. Exposure to indoor air, taken alone, is likely to be of low concern.
- It is likely that risks to individuals who repeatedly disturb soil in OU1 may approach or exceed EPA's risk range. Based on this, this pathway is considered to be of potential concern and requires remedial action to reduce or prevent exposures from disturbed soils.
- It is anticipated that non-cancer risks may be of similar or possibly even greater concern than cancer risks.

This RI will be followed by an FS. The FS will contain multiple preliminary remedial action objectives, including the following:

- 1) Mitigate the potential for inhalation exposures to asbestos fibers that would result in risks that exceed the target cancer risk range specified by EPA of 1E-06 to 1E-04
- 2) Control erosion of contaminated soil by wind and water from source locations to prevent the spread of contamination to unimpacted locations and media

- 3) Implement controls to prevent uses of the site that could pose unacceptable risks to human health or the environment or compromise the remedy

A preliminary list of Federal/state chemical- and location-specific applicable or relevant and appropriate requirements (ARARs) are provided in Table 7-1. ARARs represent the federal and state standards, requirements, criteria, or limitations that must be met by any Superfund remedial action.

Section 8

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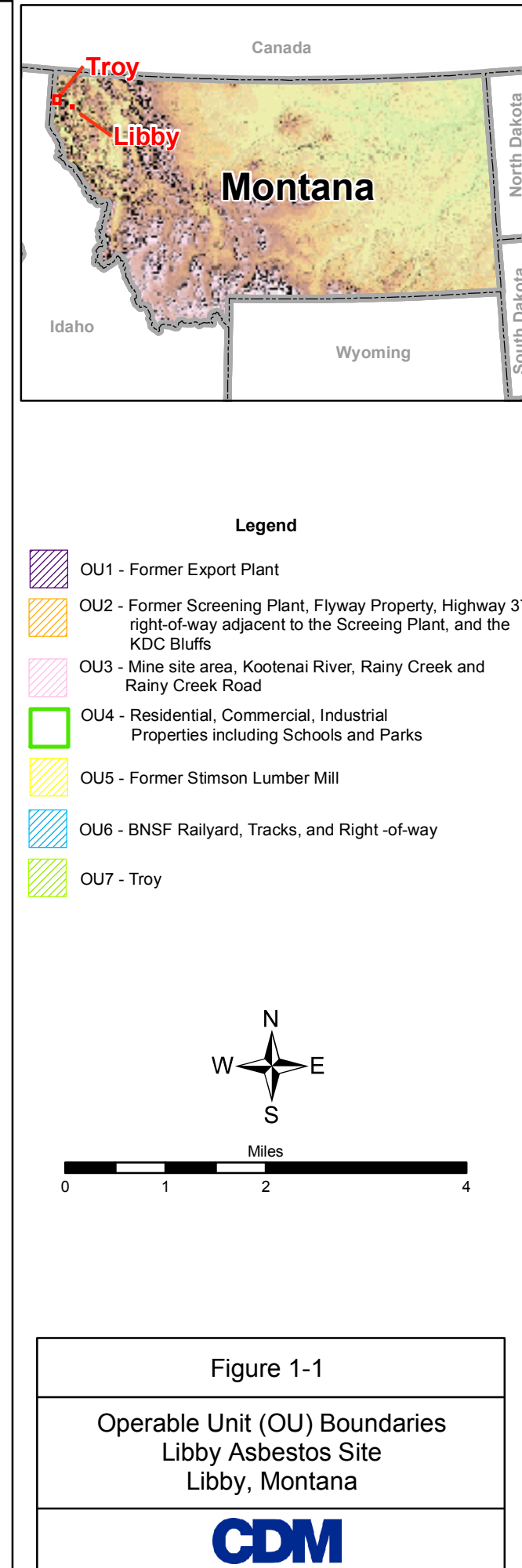
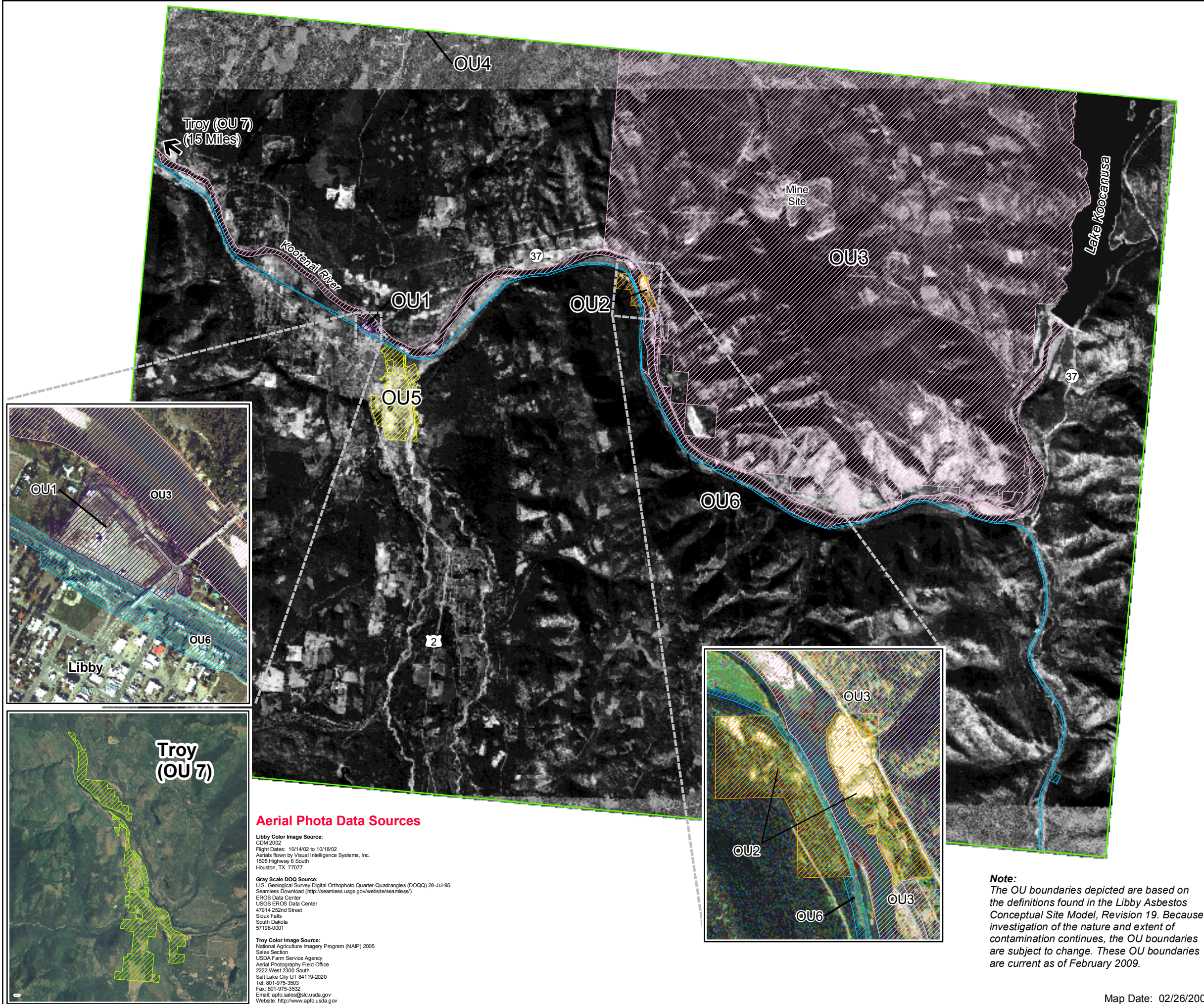
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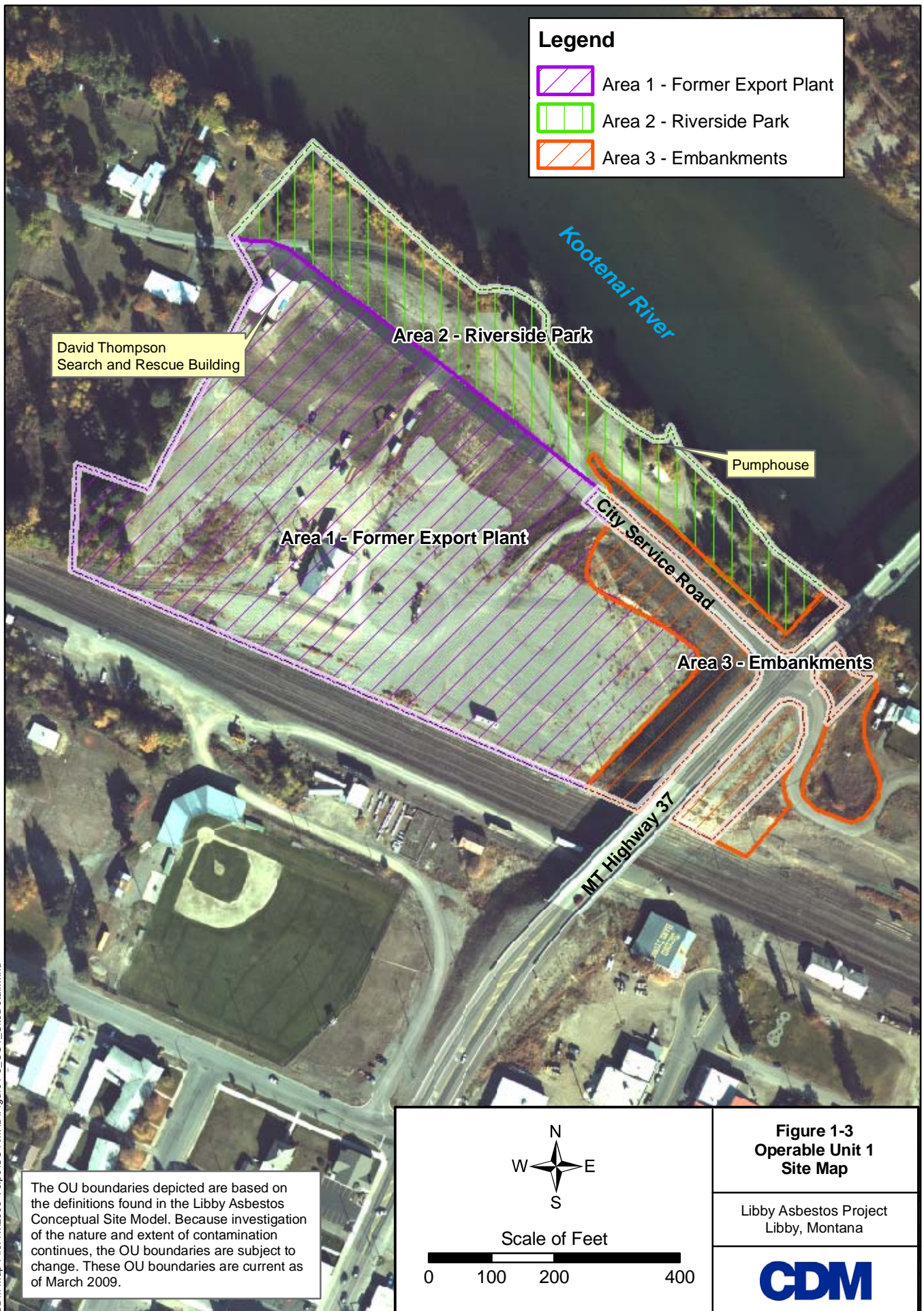
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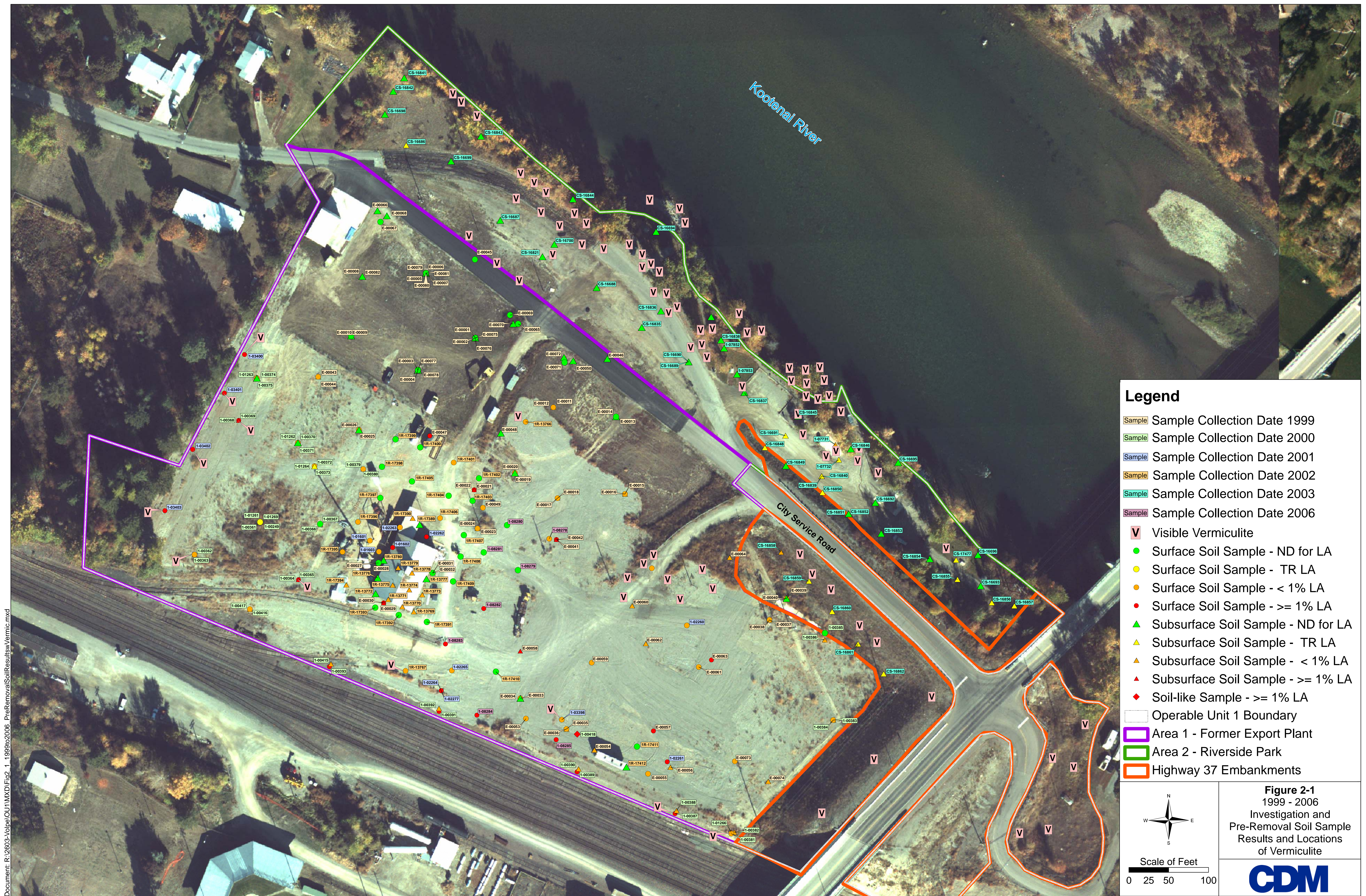


CDM Map File: R:\2603-Volpe\OU1\MXD\Figure1-2 OU1 SiteOverview.mxd



CDM Map File: R:\2603-Volpe\OU1\MXD\Figure1-3_OU1_SiteDetail.mxd





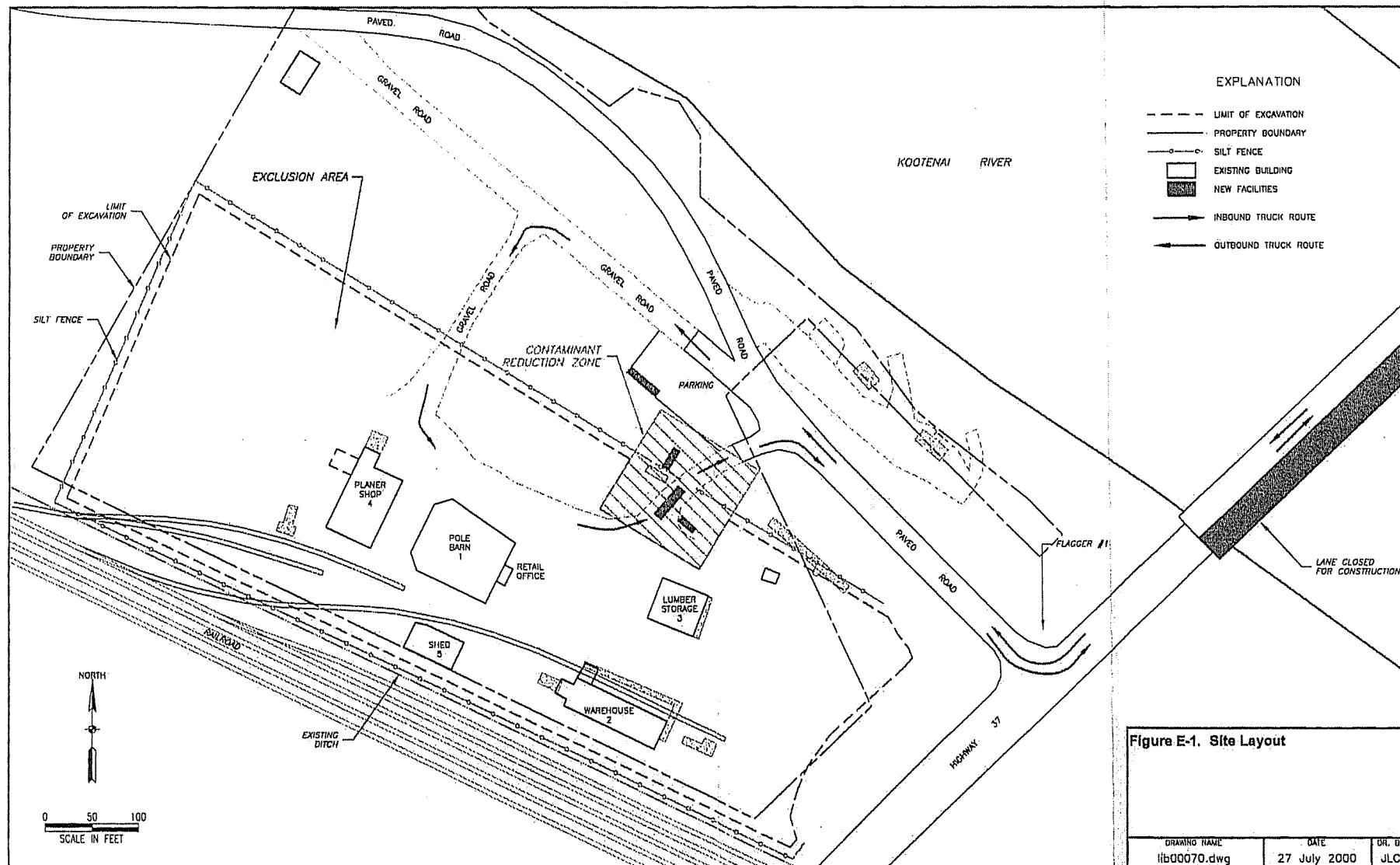
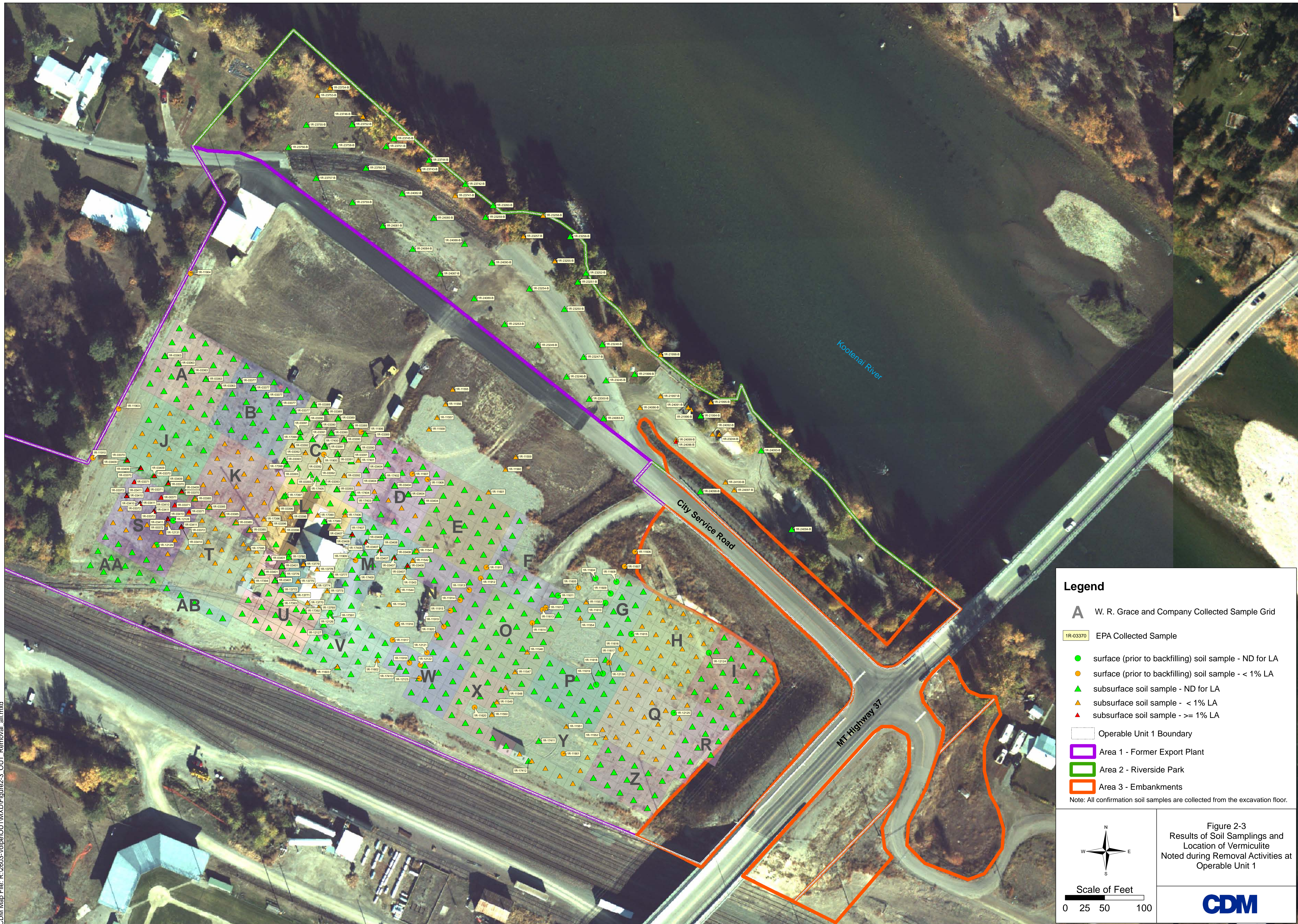


Figure 2-2. Area 1 Building Locations as of July 2000

Taken from the Approved Work Plan, Export Plant Removal Action, Libby, Montana, July 28, 2000.
Prepared for W.R. Grace and Company by URS.



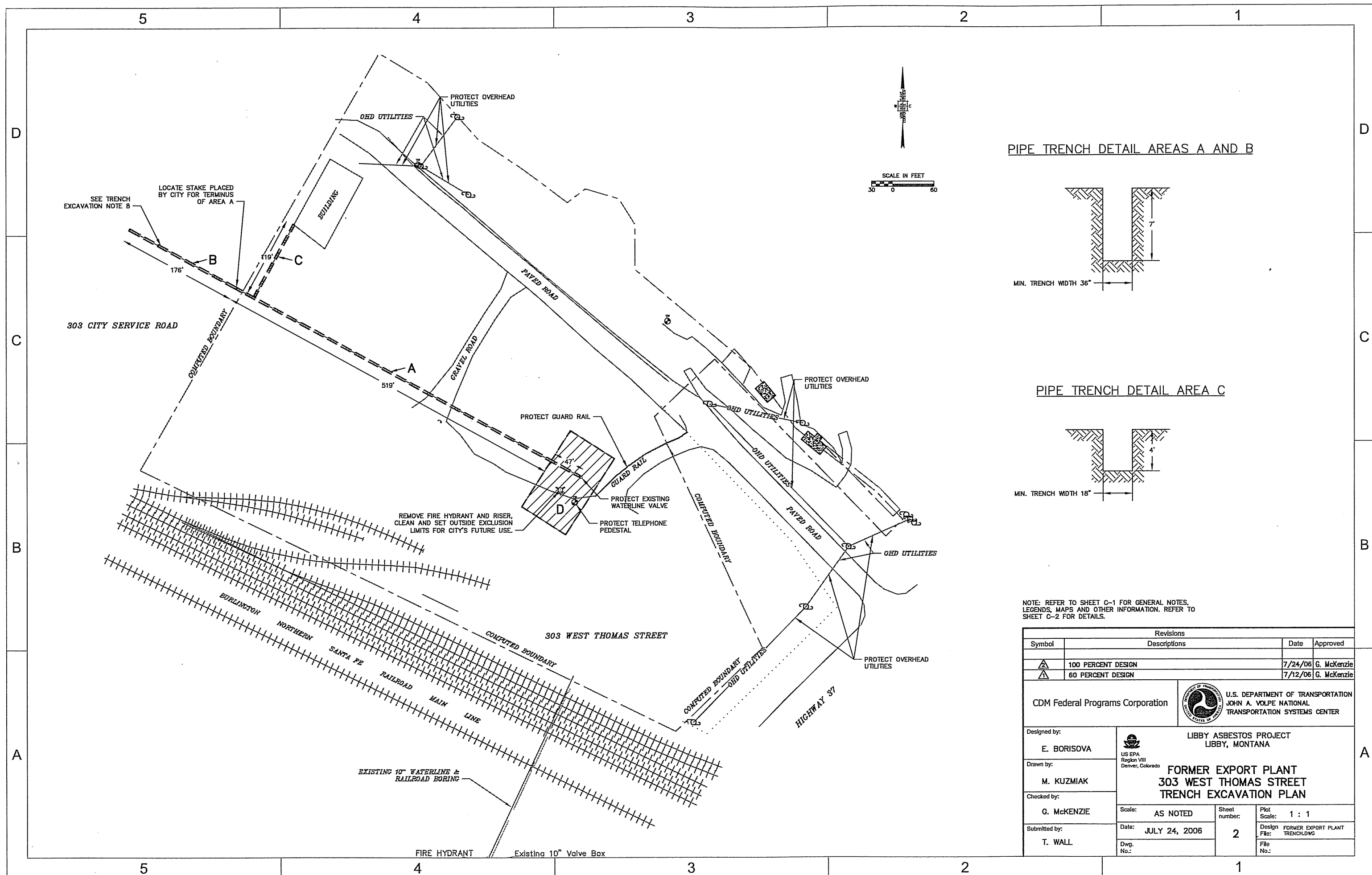
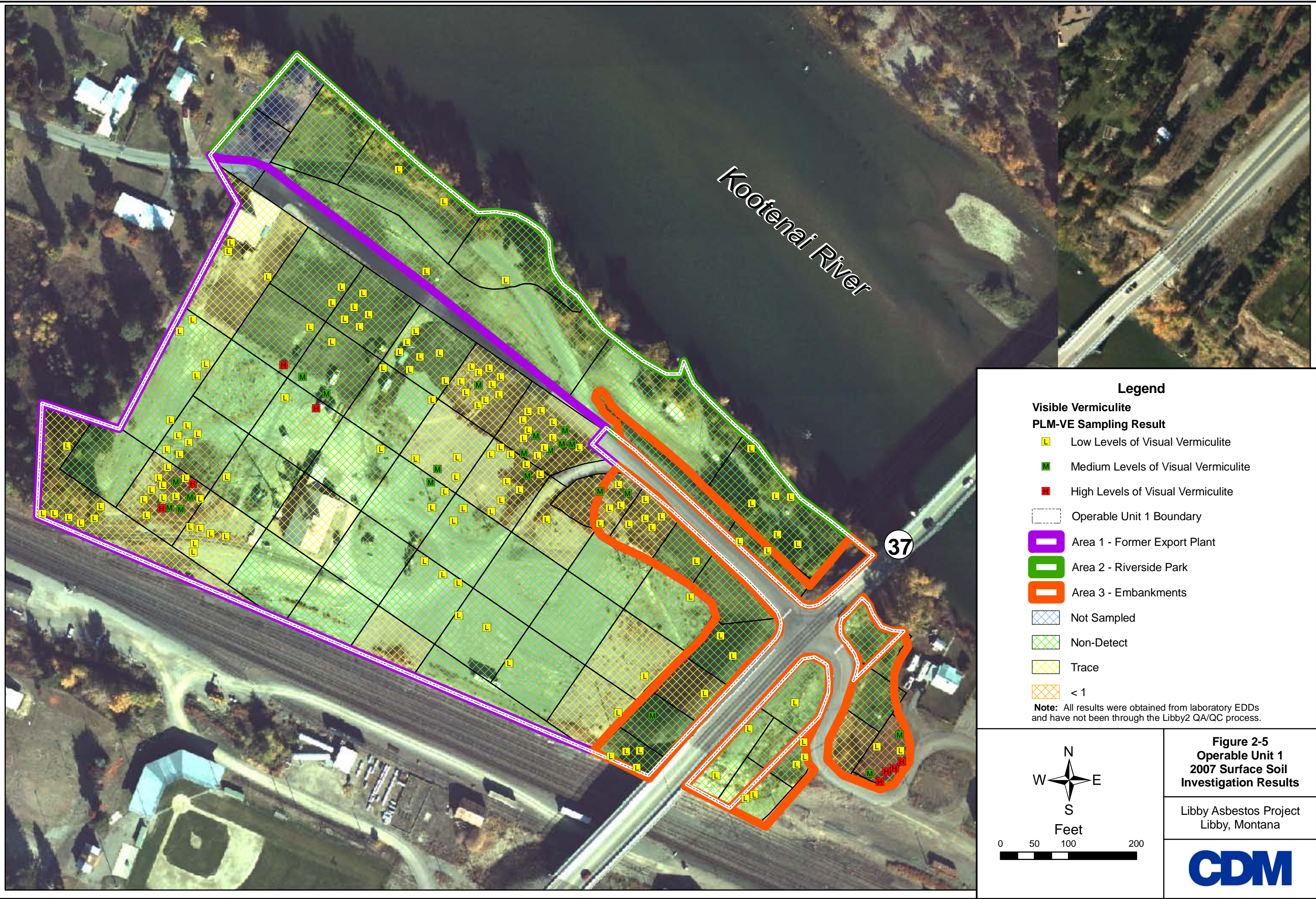


Figure 2-4. Location of the City of Libby Water Pipeline (2006 Installation)

CDM Map File: R:\2603-Volpe\ProcessPlant\gis\mxd\Figure2-5 Contamination Sampling FieldGridDesc_11x17.mxd



Legend

Visible Vermiculite

PLM-VE Sampling Result

- Low Levels of Visual Vermiculite
- Medium Levels of Visual Vermiculite
- High Levels of Visual Vermiculite
- Operable Unit 1 Boundary
- Area 1 - Former Export Plant
- Area 2 - Riverside Park
- Area 3 - Embankments
- Not Sampled
- Non-Detect
- Trace
- < 1

Note: All results were obtained from laboratory EDDs and have not been through the Libby2 QA/QC process.

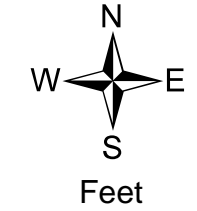
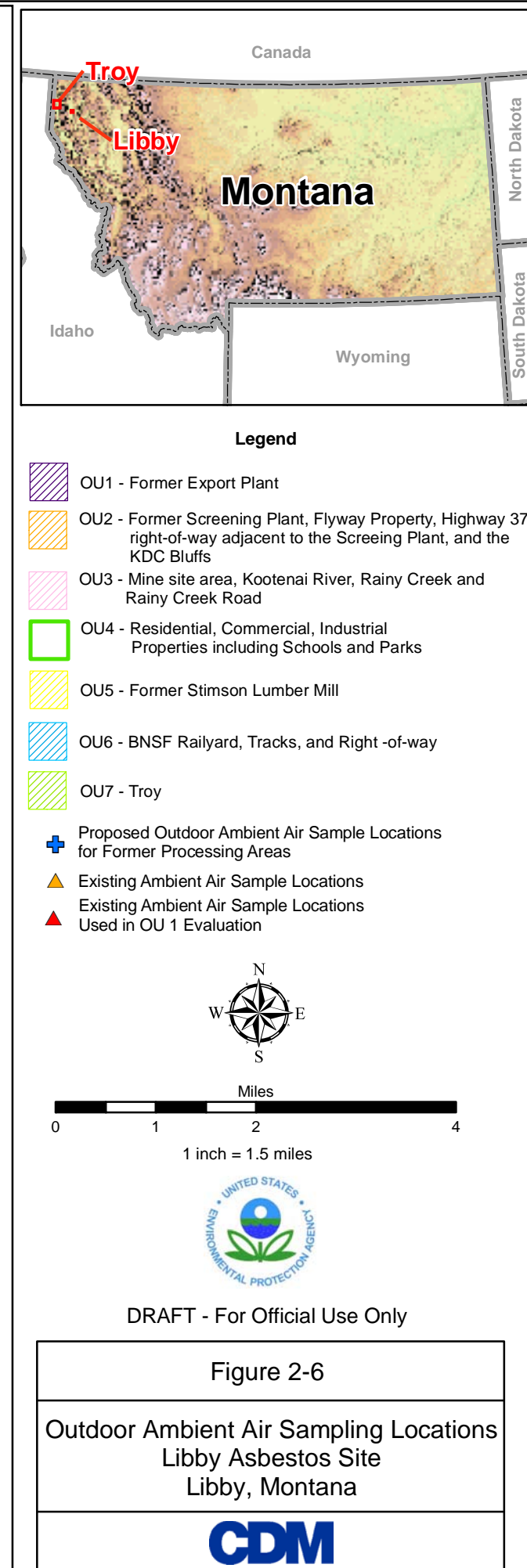
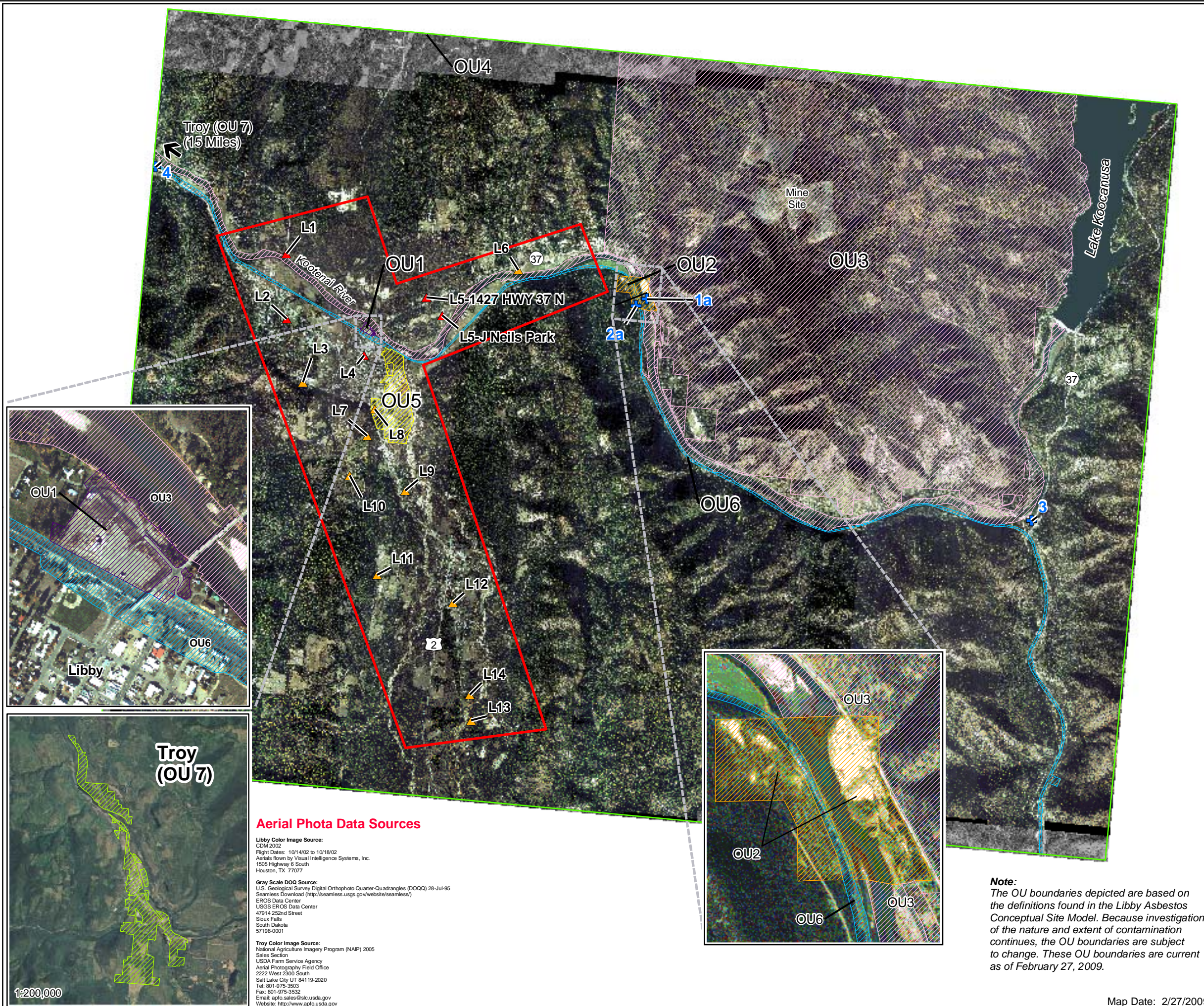


Figure 2-5
Operable Unit 1
2007 Surface Soil
Investigation Results

Libby Asbestos Project
Libby, Montana





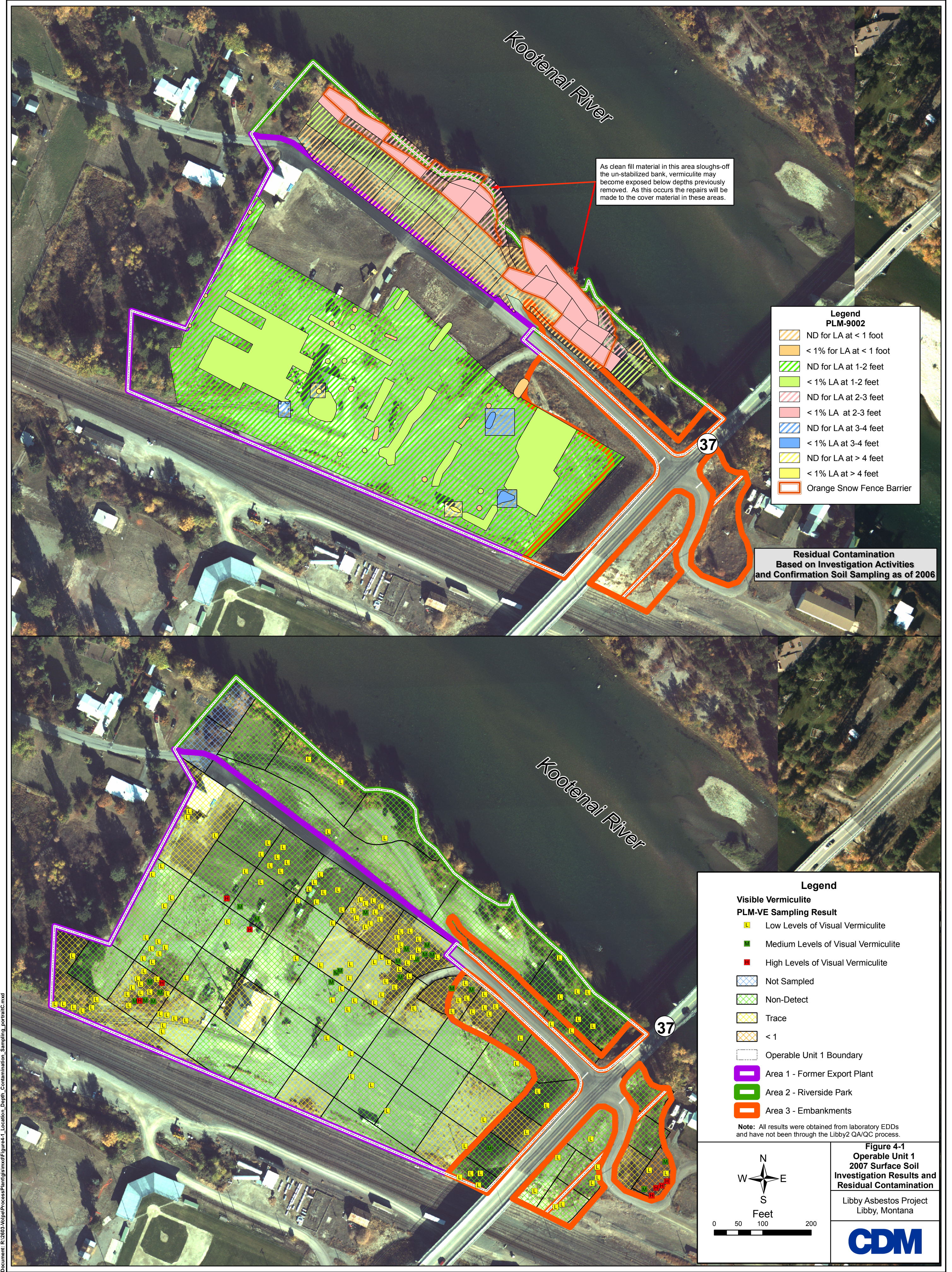
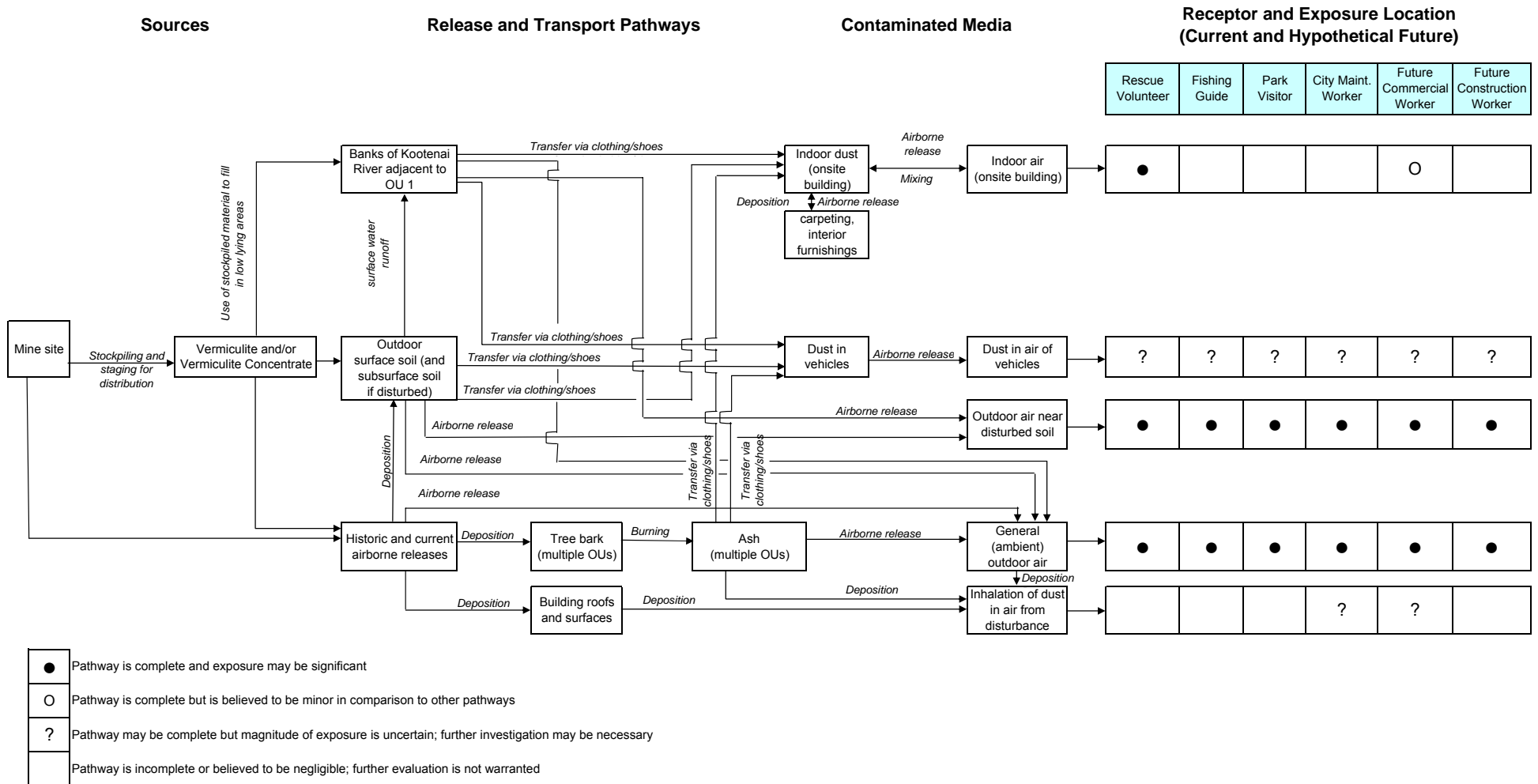


Figure 6-1. Conceptual Site Model for Inhalation Exposures to Asbestos
Libby Superfund Site -- Operable Unit 1 (Former Export Plant)



Tables

Table 2-1. Area 1 Investigation Soil Sample Results – December 1999

Sample ID	Sample Date	Category	Parent ID	Matrix	Sample Group	Location Description (Sub Location)	Sample Type	Number of Subsamples	Top Depth (inches)	Bottom Depth (inches)	Analytical Results			
											Method	LA Bin	LA (%)	C (%)
E-00001-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	A	ND	ND
E-00002-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	A	ND	ND
E-00003-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	A	ND	ND
E-00004-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	A	ND	ND
E-00005-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	A	ND	ND
E-00006-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	A	ND	ND
E-00007-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	A	ND	ND
E-00008-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	A	ND	ND
E-00009-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	A	ND	ND
E-00010-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	A	ND	ND
E-00011-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B2	< 1	ND
E-00012-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	B2	< 1	ND
E-00013-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	A	ND	ND
E-00014-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	A	ND	ND
E-00015-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B2	< 1	ND
E-00016-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	B2	< 1	ND
E-00017-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B2	< 1	ND
E-00018-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	C	2	ND
E-00019-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B2	< 1	ND
E-00020-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	A	ND	ND
E-00021-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	C	2	ND
E-00022-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	C	2	ND
E-00023-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B2	< 1	ND
E-00024-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	B2	< 1	ND
E-00025-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B2	< 1	ND
E-00026-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	A	ND	ND
E-00027-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	A	ND	ND
E-00028-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	B2	< 1	ND
E-00029-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	C	2	ND
E-00030-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	C	2	ND
E-00031-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	A	ND	< 1
E-00032-B	12/12/1999	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	B2	< 1	ND
E-00075-B	12/12/1999	Field Duplicate	E-00001	Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	A	ND	ND
E-00076-B	12/12/1999	Field Duplicate	E-00002	Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	A	ND	ND
E-00077-B	12/12/1999	Field Duplicate	E-00003	Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	A	ND	ND
E-00078-B	12/12/1999	Field Duplicate	E-00004	Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	A	ND	ND
E-00079-B	12/12/1999	Field Duplicate	E-00005	Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	A	ND	< 1
E-00080-B	12/12/1999	Field Duplicate	E-00006	Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	A	ND	< 1
E-00081-B	12/12/1999	Field Duplicate	E-00007	Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B2	< 1	ND
E-00082-B	12/12/1999	Field Duplicate	E-00008	Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	B2	< 1	ND
E-00033-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B2	< 1	ND
E-00034-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	A	ND	ND
E-00035-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B2	< 1	ND
E-00036-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	B2	< 1	ND
E-00037-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B2	< 1	ND
E-00038-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	B2	< 1	ND
E-00039-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B2	< 1	ND
E-00040-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	A	ND	ND
E-00041-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	C	3	ND
E-00042-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	C	5	ND
E-00043-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B2	< 1	ND
E-00044-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	B2	< 1	ND
E-00045-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	A	ND	ND
E-00046-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	A	ND	ND
E-00047-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	C	2	ND
E-00048-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	A	ND	ND
E-00049-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B2	< 1	ND
E-00050-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	A	ND	ND
E-00053-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B2	< 1	ND
E-00054-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B2	< 1	ND

Table 2-1. Area 1 Investigation Soil Sample Results – December 1999

Sample ID	Sample Date	Category	Parent ID	Matrix	Sample Group	Location Description (Sub Location)	Sample Type	Number of Subsamples	Top Depth (inches)	Bottom Depth (inches)	Analytical Results			
											Method	LA Bin	LA (%)	C (%)
E-00055-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B2	< 1	ND
E-00056-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B2	< 1	ND
E-00057-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	C	2	ND
E-00058-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	C	2	ND
E-00059-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B2	< 1	ND
E-00060-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B2	< 1	ND
E-00061-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B2	< 1	ND
E-00062-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B2	< 1	ND
E-00063-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	C	3	ND
E-00064-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B2	< 1	ND
E-00065-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	A	ND	ND
E-00066-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	A	ND	ND
E-00067-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	24	PLM-9002	A	ND	ND
E-00068-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	24	PLM-9002	A	ND	ND
E-00069-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	24	PLM-9002	A	ND	ND
E-00070-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	24	PLM-9002	A	ND	ND
E-00071-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	24	PLM-9002	A	ND	ND
E-00072-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	24	PLM-9002	A	ND	ND
E-00073-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	24	PLM-9002	B2	< 1	ND
E-00074-B	12/13/1999	Field Sample		Surface soil	Property	Soil	Grab	---	0	24	PLM-9002	B2	< 1	ND

Notes and Definitions:

The report excludes all lab quality control results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.

B suffix in Sample ID = non-processed sample

LA = Libby Amphibole

C = Chrysotile

ND = non-detect

PLM = polarized light microscopy

PLM-9002 = National Institute for Occupational Safety and Health 9002 method

% = percent

< = less than

Table 2-2. Area 1 Investigation Soil Sample Results – March 2000

Sample ID	Sample Date	Category	Parent ID	Matrix	Sample Group	Location Description (Sub Location)	Sample Type	Number of Subsamples	Top Depth (inches)	Bottom Depth (inches)	Analytical Results			
											Method	LA Bin	LA (%)	C (%)
1-00249	3/10/2000	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B	< 1	ND
1-00361	3/10/2000	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	B	< 1	ND
1-00362	3/10/2000	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B	< 1	ND
1-00363	3/10/2000	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	B	< 1	ND
1-00364	3/10/2000	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	C	5	ND
1-00365	3/10/2000	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	C	10	ND
1-00366	3/10/2000	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	A	ND	ND
1-00367	3/10/2000	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	B	< 1	ND
1-00368	3/10/2000	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	C	5	ND
1-00369	3/10/2000	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	C	2	ND
1-00370	3/10/2000	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B	< 1	ND
1-00371	3/10/2000	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	A	ND	ND
1-00372	3/10/2000	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B	< 1	ND
1-00373	3/10/2000	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	B	< 1	ND
1-00374	3/10/2000	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B	< 1	ND
1-00375	3/10/2000	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	A	ND	ND
1-00379	3/10/2000	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B	< 1	ND
1-00380	3/10/2000	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	C	2	ND
1-01261	3/10/2000	Field Duplicate	1-00249	Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B	< 1	ND
1-01262	3/10/2000	Field Duplicate	1-00371	Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	B	< 1	ND
1-01263	3/10/2000	Field Duplicate	1-00375	Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	A	ND	ND
1-01264	3/10/2000	Field Duplicate	1-00373	Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	B	< 1	ND
1-01269	3/10/2000	Field Duplicate	1-00361	Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	C	1	ND
1-00381	3/11/2000	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B	< 1	ND
1-00382	3/11/2000	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	B	< 1	ND
1-00383	3/11/2000	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B	< 1	ND
1-00384	3/11/2000	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	B	< 1	ND
1-00385	3/11/2000	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	A	ND	ND
1-00386	3/11/2000	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	B	< 1	ND
1-00387	3/11/2000	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	C	1	ND
1-00388	3/11/2000	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	B	< 1	ND
1-00389	3/11/2000	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	C	1	ND
1-00390	3/11/2000	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	B	< 1	ND
1-00391	3/11/2000	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	C	1	ND
1-00392	3/11/2000	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	B	< 1	ND
1-00393	3/11/2000	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	C	1	ND
1-00415	3/11/2000	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	B	< 1	ND
1-00416	3/11/2000	Field Sample		Surface soil	Property	Soil	Grab	---	0	2	PLM-9002	B	< 1	ND
1-00417	3/11/2000	Field Sample		Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	B	< 1	ND
1-00418	3/11/2000	Field Sample		Other	Property	LABELED "VERMICULITE"	Grab	---	---	---	PLM-9002	C	2	ND
1-01266	3/11/2000	Field Duplicate	1-00382	Surface soil	Property	Soil	Grab	---	2	12	PLM-9002	C	1	ND

Notes and Definitions:

The report excludes all lab quality control results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.

LA = Libby Amphibole

C = Chrysotile

ND = non-detect

PLM = polarized light microscopy

PLM-9002 = National Institute for Occupational Safety and Health 9002 method

% = percent

< = less than

Table 2-3. Area 1 Stationary Air Sample Results – April 2000

Sample ID	Sample Date	Sample Group	Volume (L)	Analytical Results (METHOD - ISO 10312)																												
				(Air = s/cc)																												
				Grid Openings	Libby Amphibole (LA)										Chrysotile (C)										Other Amphibole (OA)							
					Analytical Sensitivity	Excluded Structures			Structures Detected			Total Concentration LA	Total Count LA	Excluded Structures			Structures Detected			Total Concentration C	Total Count C	Excluded Structures			Structures Detected			Total Concentration OA	Total Count OA			
						Aspect Ratio <5:1	Length <0.5 u	Diameter >0.5 u	Length 0.5 to 5 u	Length 5 to 10 u	Length >10 u			Aspect Ratio <5:1	Length <0.5 u	Diameter >0.5 u	Length 0.5 to 5 u	Length 5 to 10 u	Length >10 u			Aspect Ratio <5:1	Length <0.5 u	Diameter >0.5 u	Length 0.5 to 5 u	Length 5 to 10 u	Length >10 u					
1-00802	4/4/2000	Lumber Yard	2256	30	0.0006	0	0	0	0.0011	0.0011	0	0.0023	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
1-00809	4/5/2000	Lumber Yard	5040	70	0.0003	0	0	0	0.0001	0	0	0.0001	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
1-01308	4/9/2000	Lumber Yard	4344	70	0.0003	0	0	0.0001	0.0003	0.0001	0	0.0006	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			

Notes and Definitions:
The report excludes all lab quality control results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.
LA = Libby Amphibole
C = Chrysotile
OA = Other Amphibole
N/A = not applicable
ISO 10312 = International Organization of Standards 10312 method
L = liters
s/cc = Structures per cubic centimeter
u = micron
< = less than
> = greater than
0.0002 - indicates concentrations above Average total LA concentration observed in OU4 2006-2008 ambient air sampling event was 0.00001 s/cc

Table 2-4. Area 1 Investigation Personal Air Sample Results – June 2000

Sample ID	Task	Sample Date	Sample Group	Volume (air=L)	Analytical Results (METHOD - ISO 10312)																																			
					(Air = s/cc)																																			
					Grid Openings	Analytical Sensitivity	Libby Amphiboles (LA)										Chrysotile (C)										Other Amphiboles (OA)													
							Excluded Structures			Structures Detected							Total Concentration LA	Total Count LA	Excluded Structures			Structures Detected							Total Concentration C	Total Count C	Excluded Structures			Structures Detected					Total Concentration OA	Total Count OA
							Aspect Ratio < 5:1	Length < 0.5 u	Diameter > 0.5u	Length 0.5 to 5 u	Length 5 to 10 u	Length > 10 u	Aspect Ratio < 5:1	Length < 0.5 u	Diameter > 0.5u	Length 0.5 to 5 u			Length 5 to 10 u	Length > 10 u	Aspect Ratio < 5:1	Length < 0.5 u	Diameter > 0.5u	Length 0.5 to 5 u	Length 5 to 10 u	Length > 10 u	Aspect Ratio < 5:1	Length < 0.5 u			Diameter > 0.5u	Length 0.5 to 5 u	Length 5 to 10 u	Length > 10 u						
1R-00039	sweep in the planer breakroom at millwork west	6/25/2000	Lumber Yard	417	40	0.1617	0	0	0.3235	0.3235	0	0	0.6470	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								
1R-00042	working in bag house - moving bags of insulation and sweep floor, Millwork West	6/25/2000	Lumber Yard	399	40	0.1690	0	0	1.0143	0.5071	0.5071	0.3381	2.3666	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0								

Notes and Definitions:
The report excludes all lab quality control results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.
LA = Libby Amphibole
C = Chrysotile
OA = Other Amphibole
ISO 10312 = International Organization of Standards 10312 method
L = liters
s/cc = Structures per cubic centimeter
u = micron
< = less than
> = greater than

Table 2-5. Area 1 Removal-related Soil Sample Results – October and November 2000

Sample ID	Sample Date	Category	Parent ID	Matrix	Sample Group	Location Description (Sub Location)	Sample Type	Number of Subsamples	Top Depth (inches)*	Bottom Depth (inches)*	Analytical Results**			
											Method	LA Bin	LA (%)	C (%)
A-1.5	10/25/2000	W.R. Grace Field Sample		Soil	***	Grid A-1.5	Composite	5	16	18	EPA/600/R-93/16	***	0.0	
A-6.10	10/25/2000	W.R. Grace Field Sample		Soil	***	Grid A-6.10	Composite	5	16	18	EPA/600/R-93/16	***	0.0	
A-11.15	10/25/2000	W.R. Grace Field Sample		Soil	***	Grid A-11.15	Composite	5	16	18	EPA/600/R-93/16	***	0.0	
1R-03363	10/25/2000	Split of W.R. Grace Field Sample		Soil	Property	Grid A-11.15	Composite	5	6	14	PLM-9002	A	ND	ND
A-16.20	10/25/2000	W.R. Grace Field Sample		Soil	***	Grid A-16.20	Composite	5	16	18	EPA/600/R-93/16	***	0.0	
A-21.25	10/25/2000	W.R. Grace Field Sample		Soil	***	Grid A-21.25	Composite	5	16	18	EPA/600/R-93/16	***	0.0	
B-1.5	10/31/2000	W.R. Grace Field Sample		Soil	***	Grid B-1.5	Composite	5	16	18	EPA/600/R-93/16	***	0.0	
B-6.10	10/31/2000	W.R. Grace Field Sample		Soil	***	Grid B-6.10	Composite	5	16	18	EPA/600/R-93/16	***	0.0	
1R-03377	10/31/2000	Split of W.R. Grace Field Sample		Soil	Property	Grid B-6.10	Composite	5	6	14	PLM-9002	A	ND	ND
B-11.15	10/31/2000	W.R. Grace Field Sample		Soil	***	Grid B-11.15	Composite	5	16	18	EPA/600/R-93/16	***	0.0	
B-16.20	10/31/2000	W.R. Grace Field Sample		Soil	***	Grid B-16.20	Composite	5	16	18	EPA/600/R-93/16	***	0.0	
B-21.25	10/31/2000	W.R. Grace Field Sample		Soil	***	Grid B-21.25	Composite	5	16	18	EPA/600/R-93/16	***	0.0	
C-1.5	11/3/2000	W.R. Grace Field Sample		Soil	***	Grid C-1.5	Composite	5	16	18	EPA/600/R-93/16	***	0.0	
1R-03389	11/3/2000	Split of W.R. Grace Field Sample		Soil	Property	Grid C-1.5	Composite	5	18	22	PLM-9002	A	ND	ND
C-6.10	11/3/2000	W.R. Grace Field Sample		Soil	***	Grid C-6.10	Composite	5	16	18	EPA/600/R-93/16	***	0.0	
1R-03390	11/3/2000	Split of W.R. Grace Field Sample		Soil	Property	Grid C-6.10	Composite	5	18	22	PLM-9002	A	ND	ND
C-11.15	11/3/2000	W.R. Grace Field Sample		Soil	***	Grid C-11.15	Composite	5	16	18	EPA/600/R-93/16	***	0.0	
1R-03391	11/3/2000	Split of W.R. Grace Field Sample		Soil	Property	Grid C-11.15	Composite	5	18	22	PLM-9002	A	ND	ND
C-16.20	11/3/2000	W.R. Grace Field Sample		Soil	***	Grid C-16.20	Composite	5	16	18	EPA/600/R-93/16	***	0.5	
1R-03392	11/3/2000	Split of W.R. Grace Field Sample		Soil	Property	Grid C-16.20	Composite	5	18	22	PLM-9002	B	< 1	ND
C-21.25	11/3/2000	W.R. Grace Field Sample		Soil	***	Grid C-21.25	Composite	5	16	18	EPA/600/R-93/16	***	0.0	
1R-03393	11/3/2000	Split of W.R. Grace Field Sample		Soil	Property	Grid C-21.25	Composite	5	18	22	PLM-9002	A	ND	ND
D-1.5	11/7/2000	W.R. Grace Field Sample		Soil	***	Grid D-1.5	Composite	5	16	18	EPA/600/R-93/16	***	0.0	
D-6.10	11/7/2000	W.R. Grace Field Sample		Soil	***	Grid D-6.10	Composite	5	16	18	EPA/600/R-93/16	***	0.0	
D-11.15	11/7/2000	W.R. Grace Field Sample		Soil	***	Grid D-11.15	Composite	5	16	18	EPA/600/R-93/16	***	0.0	
1R-03404	11/7/2000	Split of W.R. Grace Field Sample		Soil	Property	Grid D-11.15	Composite	5	8	12	PLM-9002	A	ND	ND
D-16.20	11/7/2000	W.R. Grace Field Sample		Soil	***	Grid D-16.20	Composite	5	16	18	EPA/600/R-93/16	***	Trace	
D-21.25	11/7/2000	W.R. Grace Field Sample		Soil	***	Grid D-21.25	Composite	5	16	18	EPA/600/R-93/16	***	0.0	
Grid E	12/4/2000	W.R. Grace Field Sample		Soil	***	Grid E	Composite	5	16	18	EPA/600/R-93/16	***	0.0	
Grid F	12/4/2000	W.R. Grace Field Sample		Soil	***	Grid F	Composite	4	16	18	EPA/600/R-93/16	***	0.0	
Grid G	11/21/2000	W.R. Grace Field Sample		Soil	***	Grid G	Composite	5	16	18	EPA/600/R-93/16	***	0.0	
Grid H	11/20/2000	W.R. Grace Field Sample		Soil	***	Grid H	Composite	5	16	18	EPA/600/R-93/16	***	Trace	
Grid I	11/20/2000	W.R. Grace Field Sample		Soil	***	Grid I	Composite	5	16	18	EPA/600/R-93/16	***	0.0	
J-1.5	10/28/2000	W.R. Grace Field Sample		Soil	***	Grid J-1.5	Composite	5	16	18	EPA/600/R-93/16	***	0.3	
J-6.10	10/28/2000	W.R. Grace Field Sample		Soil	***	Grid J-6.10	Composite	5	16	18	EPA/600/R-93/16	***	0.0	
J-11.15	10/28/2000	W.R. Grace Field Sample		Soil	***	Grid J-11.15	Composite	5	16	18	EPA/600/R-93/16	***	< 0.25	
J-16.20	10/28/2000	W.R. Grace Field Sample		Soil	***	Grid J-16.20	Composite	5	16	18	EPA/600/R-93/16	***	0.5	
J-21.25	10/28/2000	W.R. Grace Field Sample		Soil	***	Grid J-21.25	Composite	5	16	18	EPA/600/R-93/16	***	1.0	
1R-03370	10/28/2000	Split of W.R. Grace Field Sample		Soil	Property	Grid J-21.25	Composite	5	12	24	PLM-9002	C	2	ND
1R-03409	11/9/2000	Split of W.R. Grace Field Sample		Soil	Property	Grid 2J-21.25	Composite	5	12	18	PLM-9002	A	ND	ND
K-1.5	11/1/2000	W.R. Grace Field Sample		Soil	***	Grid K-1.5	Composite	5	16	18	EPA/600/R-93/116	***	Trace	
K-6.10	11/1/2000	W.R. Grace Field Sample		Soil	***	Grid K-6.10	Composite	5	16	18	EPA/600/R-93/116	***	Trace	
K-11.15	11/1/2000	W.R. Grace Field Sample		Soil	***	Grid K-11.15	Composite	5	16	18	EPA/600/R-93/116	***	0.8	
K-16.20	11/1/2000	W.R. Grace Field Sample		Soil	***	Grid K-16.20	Composite	5	16	18	EPA/600/R-93/116	***	Trace	
K-21.25	11/1/2000	W.R. Grace Field Sample		Soil	***	Grid K-21.25	Composite	5	16	18	EPA/600/R-93/116	***	Trace	
1R-03385	11/1/2000	Split of W.R. Grace Field Sample		Soil	Property	Grid K-21.25	Composite	5	6	8	PLM-9002	A	ND	ND
L-1.5	11/6/2000	W.R. Grace Field Sample		Soil	***	Grid L-1.5	Composite	5	16	18	EPA/600/R-93/116	***	0.0	
L-6.9	11/6/2000	W.R. Grace Field Sample		Soil	***	Grid L-6.9	Composite	4	16	18	EPA/600/R-93/116	***	0.0	
1R-03396	11/6/2000	Split of W.R. Grace Field Sample		Soil	Property	Grid L-10.13	Composite	4	18	22	PLM-9002	B	< 1	ND
L-14.16	11/6/2000	W.R. Grace Field Sample		Soil	***	Grid L-14.16	Composite	3	16	18	EPA/600/R-93/116	***	0.0	
M-1.5	11/6/2000	W.R. Grace Field Sample		Soil	***	Grid M-1.5	Composite	5	16	18	EPA/600/R-93/116	***	0.0	
1R-03407	11/7/2000	Split of W.R. Grace Field Sample		Soil	Property	Grid M-6.10	Composite	5	0	12	PLM-9002	C	2	ND
1R-03408	11/9/2000	Split of W.R. Grace Field Sample		Soil	Property	Grid 2M-6.10	Composite	5	0	18	PLM-9002	A	ND	ND
M-11.16	11/6/2000	W.R. Grace Field Sample		Soil	***	Grid M-11.16	Composite	6	16	18	EPA/600/R-93/116	***	0.0	

Sample ID	Sample Date	Category	Parent ID	Matrix	Sample Group	Location Description (Sub Location)	Sample Type	Number of Subsamples	Top Depth (inches)*	Bottom Depth (inches)*	Analytical Results**				
											Method	LA Bin	LA (%)	C (%)	
Grid N	12/1/2000	W.R. Grace Field Sample		Soil	***	Grid N	Composite	3	16	18	EPA/600/R-93/116	***		0.0	
Grid O	12/4/2000	W.R. Grace Field Sample		Soil	***	Grid O	Composite	5	16	18	EPA/600/R-93/116	***		0.0	
Grid P	12/1/2000	W.R. Grace Field Sample		Soil	***	Grid P	Composite	4	16	18	EPA/600/R-93/116	***		0.0	
Grid Q	11/20/2000	W.R. Grace Field Sample		Soil	***	Grid Q	Composite	5	16	18	EPA/600/R-93/116	***	Trace		
Grid R	11/20/2000	W.R. Grace Field Sample		Soil	***	Grid R	Composite	3	16	18	EPA/600/R-93/116	***		0.0	
S-1.5	10/28/2000	W.R. Grace Field Sample		Soil	***	Grid S-1.5	Composite	5	16	18	EPA/600/R-93/116	***		0.3	
1R-03371	10/28/2000	Split of W.R. Grace Field Sample		Soil	Property	Grid S-1.5	Composite	5	10	18	PLM-9002	C		2	ND
S-6.10	10/28/2000	W.R. Grace Field Sample		Soil	***	Grid S-6.10	Composite	5	16	18	EPA/600/R-93/116	***		2.0	
1R-03372	10/28/2000	Split of W.R. Grace Field Sample		Soil	Property	Grid S-6.10	Composite	5	10	18	PLM-9002	C		2	ND
1R-03410	11/9/2000	Split of W.R. Grace Field Sample		Soil	Property	Grid 2S-6.10	Composite	5	12	18	PLM-9002	B		< 1	ND
1R-03411	11/9/2000	Split of W.R. Grace Field Sample		Soil	Property	duplicate of 1R-03411	Composite	5	12	18	PLM-9002	C		2	ND
S-11.15	10/28/2000	W.R. Grace Field Sample		Soil	***	Grid S-11.15	Composite	5	16	18	EPA/600/R-93/116	***		0.5	
S-16.20	10/28/2000	W.R. Grace Field Sample		Soil	***	Grid S-16.20	Composite	5	16	18	EPA/600/R-93/116	***		0.8	
S-21.25	10/28/2000	W.R. Grace Field Sample		Soil	***	Grid S-21.25	Composite	5	16	18	EPA/600/R-93/116	***		0.0	
T-1.5	11/2/2000	W.R. Grace Field Sample		Soil	***	Grid T-1.5	Composite	5	16	18	EPA/600/R-93/116	***	Trace		
T-6.10	11/2/2000	W.R. Grace Field Sample		Soil	***	Grid T-6.10	Composite	5	16	18	EPA/600/R-93/116	***	Trace		
T-11.15	11/2/2000	W.R. Grace Field Sample		Soil	***	Grid T-11.15	Composite	5	16	18	EPA/600/R-93/116	***	Trace		
U-1.4	11/6/2000	W.R. Grace Field Sample		Soil	***	Grid U-1.4	Composite	4	16	18	EPA/600/R-93/116	***		0.0	
1R-03401	11/6/2000	Split of W.R. Grace Field Sample		Soil	Property	Grid U-1.4	Composite	4	18	22	PLM-9002	A		ND	ND
Grid U	12/4/2000	W.R. Grace Field Sample		Soil	***	Grid U	Composite	3	16	18	EPA/600/R-93/116	***		0.0	
Grid V	12/1/2000	W.R. Grace Field Sample		Soil	***	Grid V	Composite	5	16	18	EPA/600/R-93/116	***		0.0	
Grid W	12/1/2000	W.R. Grace Field Sample		Soil	***	Grid W	Composite	3	16	18	EPA/600/R-93/116	***		0.0	
Grid X	12/1/2000	W.R. Grace Field Sample		Soil	***	Grid X	Composite	4	16	18	EPA/600/R-93/116	***		0.0	
Grid Y	11/20/2000	W.R. Grace Field Sample		Soil	***	Grid Y	Composite	3	16	18	EPA/600/R-93/116	***	Trace		
Grid Z	11/20/2000	W.R. Grace Field Sample		Soil	***	Grid Z	Composite	3	16	18	EPA/600/R-93/116	***		0.0	
Grid AA	11/21/2000	W.R. Grace Field Sample		Soil	***	Grid AA	Composite	2	16	18	EPA/600/R-93/116	***		0.0	
Grid AB	11/21/2000	W.R. Grace Field Sample		Soil	***	Grid AB	Composite	2	16	18	EPA/600/R-93/116	***		0.0	
railroad tracks	12/4/2000	W.R. Grace Field Sample		Soil	***	tracks	Composite	7	0	2	EPA/600/R-93/116	***		< 0.01	

Notes and Definitions:

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Data for samples collected by W.R. Grace and analyzed by R.J. Lee Group using EPA/600/R-93/16 taken from the *Final Report Removal Activities at the Export Plant, Libby, Montana*. Prepared for W.R. Grace and Company by URS. March 16, 2001.

* = depths are reported directly from documentation; no attempt is made in this report to rectify discrepancies in samples depths reported by Grace and EPA contractors

** = W.R. Grace field samples analyzed by R.J. Lee Group; splits of W.R. Grace field samples analyzed by EMSL Analytical, which accounts for differences in reporting format

*** = not reported

LA = Libby Amphibole

C = Chrysotile

ND = non-detect

EPA = United States Environmental Protection Agency

PLM = polarized light microscopy

PLM-9002 = National Institute for Occupational Safety and Health 9002 method

% = percent

< = less than

Table 2-6. Area 1 Investigation Soil Sample Results – March/April/August 2001

Sample ID	Sample Date	Category	Parent ID	Matrix	Sample Group	Location Description (Sub Location)	Sample Type	Number of Subsamples	Top Depth (inches)	Bottom Depth (inches)	Analytical Results			
											Method	LA Bin	LA (%)	C (%)
1-01601	3/2/2001	Field Sample		Mining waste	Property	northern section of the	Grab	---	0	1	PLM-9002	B	< 1	ND
1-01602	3/2/2001	Field Sample		Mining waste	Property		Grab	---	0	1	PLM-9002	C	2	ND
1-01603	3/2/2001	Field Sample		Mining waste	Property	south wall of bag house on the	Grab	---	0	1	PLM-9002	B	< 1	ND
1-02277	4/19/2001	Field Duplicate	1-02264	Mining waste	Property	Small shed, Southwest corner	Grab	---	0	6	PLM-9002	C	35	ND
1-02260	4/19/2001	Field Sample		Mining waste	Scale Barn	Scale house, North wall	Grab	---	0	6	PLM-9002	B	< 1	ND
1-02261	4/19/2001	Field Sample		Mining waste	Warehouse	Warehouse, E. side by door	Grab	---	0	6	PLM-9002	C	2	ND
1-02262	4/19/2001	Field Sample		Mining waste	Planer Building	Left side of door, Planer Bldg.	Grab	---	0	6	PLM-9002	C	5	ND
1-02263	4/19/2001	Field Sample		Mining waste	Property	Right side of door, building	Grab	---	0	6	PLM-9002	B	< 1	ND
1-02264	4/19/2001	Field Sample		Mining waste	Property	Small shed, Southwest corner	Grab	---	0	6	PLM-9002	C	25	ND
1-02206	4/24/2001	Field Sample		Surface soil	Property	1 1/2-inch minus grade material	Grab	---	0	6	PLM-9002	A	ND	ND
1-03398	8/8/2001	Field Sample		Surface soil	Property	between building and RR	Composite	3	0	4	PLM-9002	B	< 1	ND
1-03400	8/10/2001	Field Sample		Surface soil	Property	boundary sample	Grab	---	0	4	PLM-9002	C	5	ND
1-03401	8/10/2001	Field Sample		Surface soil	Property	boundary sample	Grab	---	0	4	PLM-9002	C	3	ND
1-03402	8/10/2001	Field Sample		Surface soil	Property	boundary sample	Grab	---	0	4	PLM-9002	C	8	ND
1-03403	8/10/2001	Field Sample		Surface soil	Property	boundary sample	Grab	---	0	4	PLM-9002	C	15	ND

Notes and Definitions:

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LA = Libby Amphibole

C = Chrysotile

ND = non-detect

PLM = polarized light microscopy

PLM-9002 = National Institute for Occupational Safety and Health 9002 method

% = percent

< = less than

Table 2-7. Area 1 Investigation Bulk Materials Sampling Results – April 2001

Sample ID	Sample Date	Sample Group	Analytical Results		
			Method	LA (%)	C (%)
1R-04313	4/19/2001	Planer Shop	PLM-9002	< 1	10
1R-04314	4/19/2001	Planer Shop	PLM-9002	ND	ND
1R-04315	4/19/2001	Planer Shop	PLM-9002	ND	ND
1R-04316	4/19/2001	Planer Shop	PLM-9002	2	< 1
1R-04317	4/19/2001	Planer Shop	PLM-9002	< 1	3
1R-04318	4/19/2001	Planer Shop	PLM-9002	< 1	< 1
1R-04319	4/19/2001	Pole Barn	PLM-9002	5	< 1
1R-04320	4/19/2001	Pole Barn	PLM-9002	2	< 1
1R-04401	4/19/2001	Pole Barn	PLM-9002	2	< 1
1R-04402	4/19/2001	Pole Barn	PLM-9002	< 1	< 1
1R-04403	4/19/2001	Pole Barn	PLM-9002	ND	ND
1R-04404	4/19/2001	Pole Barn	PLM-9002	ND	ND
1R-04405	4/19/2001	Planer Shop	PLM-9002	ND	ND
1R-04406	4/19/2001	Pole Barn	PLM-9002	< 1	ND
1R-04407	4/19/2001	Shed	PLM-9002	< 1	ND
1R-04408	4/19/2001	Shed	PLM-9002	ND	ND
1R-04409	4/19/2001	Shed	PLM-9002	ND	ND
1R-04410	4/19/2001	Shed	PLM-9002	ND	ND
1R-04411	4/19/2001	Shed	PLM-9002	< 1	ND
1R-04412	4/19/2001	Shed	PLM-9002	< 1	ND
1R-04413	4/19/2001	Warehouse	PLM-9002	5	ND
1R-04414	4/19/2001	Warehouse	PLM-9002	< 1	ND
1R-04415	4/19/2001	Warehouse	PLM-9002	2	ND
1R-04416	4/19/2001	Warehouse	PLM-9002	2	ND
1R-04417	4/19/2001	Warehouse	PLM-9002	< 1	ND
1R-04418	4/19/2001	Warehouse	PLM-9002	< 1	ND
1R-04419	4/19/2001	Warehouse	PLM-9002	3	ND
1R-04420	4/19/2001	Warehouse	PLM-9002	< 1	ND
1R-04421	4/19/2001	Warehouse	PLM-9002	< 1	ND
1R-04422	4/19/2001	Warehouse	PLM-9002	2	ND
1R-04423	4/19/2001	Warehouse	PLM-9002	2	ND
1R-04424	4/19/2001	Warehouse	PLM-9002	5	ND
1R-04425	4/19/2001	Warehouse	PLM-9002	< 1	ND
1R-04426	4/19/2001	Scale Barn/ Lumber Storage	PLM-9002	< 1	5
1R-04427	4/19/2001	Scale Barn/ Lumber Storage	PLM-9002	2	ND
1R-04428	4/19/2001	Scale Barn/ Lumber Storage	PLM-9002	3	ND
1R-04429	4/19/2001	Scale Barn/ Lumber Storage	PLM-9002	< 1	10
1R-04430	4/19/2001	Scale Barn/ Lumber Storage	PLM-9002	ND	ND
1R-04431	4/19/2001	Scale Barn/ Lumber Storage	PLM-9002	< 1	< 1

Notes and Definitions:

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LA = Libby Amphibole

C = Chrysotile

ND = non-detect

PLM = polarized light microscopy

PLM-9002 = National Institute for Occupational Safety and Health 9002 method

% = percent

< = less than

Table 2-8. Area 1 Investigation Dust Sample Results – April/August 2001

Sample ID	Sample Date	Sample Group	Area (cm ²)	Analytical Results (METHOD - ISO 10312) (Dust = s/cm ²)																										
				Grid Openings	Libby Amphibole (LA)								Chrysotile (C)								Other Amphibole (OA)									
					Analytical Sensitivity	Excluded Structures			Structures Detected			Total Concentration LA	Total Count LA	Excluded Structures			Structures Detected			Total Concentration C	Total Count C	Excluded Structures			Structures Detected			Total Concentration OA	Total Count OA	
						Aspect Ratio <5:1	Length <0.5 u	Diameter >0.5u	Length 0.5 to 5 u	Length 5 to 10 u	Length >10 u			Aspect Ratio <5:1	Length <0.5 u	Diameter >0.5u	Length 0.5 to 5 u	Length 5 to 10 u	Length >10 u			Aspect Ratio <5:1	Length <0.5 u	Diameter >0.5u	Length 0.5 to 5 u	Length 5 to 10 u	Length >10 u			
1R-04432	4/19/2001	Warehouse	100	10	84,918	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1R-04433	4/19/2001	Warehouse	100	10	84,918	0	0	0	0	169,836	0	169,836	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1-03542	8/28/2001	Shed	300	10	2,436	12,182	0	26,800	70,655	19,491	0	129,127	53	0	0	0	4,873	0	0	4,873	2	0	0	0	0	0	0	0		
1-03543	8/28/2001	Building	300	10	6,090	6,091	0	6,091	67,000	12,182	6,091	97,455	16	0	0	0	6,091	0	0	6,091	1	0	0	0	0	0	0	0		
1-03544	8/28/2001	Property	300	10	2,436	0	0	2,436	14,618	2,436	0	19,491	8	0	0	0	2,436	0	0	2,436	1	0	0	0	0	0	0	0		
1-03545	8/28/2001	Property	300	10	609	2,436	0	3,045	30,455	3,655	609	40,200	66	0	0	0	1,827	0	0	1,827	3	0	0	0	0	0	0	0		

Notes and Definitions:
The report excludes all lab quality control results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.
LA = Libby Amphibole
C = Chrysotile
OA = Other Amphibole
cm² = square centimeter
s/cm² = Structures per square centimeter
< = less than
> = greater than
u = micron

Table 2-9. Area 1 Removal-Related Dust Sample Results – September/October 2001

Sample ID	Sample Date	Sample Group	Area (cm ²)	Analytical Results (METHOD - ISO 10312) (Dust = s/cm ²)																											
				Grid Openings	Analytical Sensitivity	Libby Amphibole (LA)							Chrysotile (C)							Other Amphibole (OA)											
						Excluded Structures			Structures Detected			Total Concentration LA	Total Count LA	Excluded Structures			Structures Detected			Total Concentration C	Total Count C	Excluded Structures			Structures Detected			Total Concentration OA	Total Count OA		
						Aspect Ratio <5:1	Length <0.5 u	Diameter >0.5u	Length 0.5 to 5 u	Length 5 to 10 u	Length >10 u			Aspect Ratio <5:1	Length <0.5 u	Diameter >0.5u	Length 0.5 to 5 u	Length 5 to 10 u	Length >10 u			Aspect Ratio <5:1	Length <0.5 u	Diameter >0.5u	Length 0.5 to 5 u	Length 5 to 10 u	Length >10 u				
1R-09971	9/6/2001	Property	300	10	203	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1-03852	9/15/2001	Property	300	10	121	0	0	0	365	0	0	365	3	0	0	0	122	0	0	122	1	0	0	0	0	0	0	0	0	0	0
1R-10787	10/12/2001	Property	300	10	6,090	0	0	85,273	201,000	140,091	18,273	444,636	73	0	0	0	12,182	6,091	6,091	24,364	4	0	0	6,091	0	0	0	6,091	1	0	0
1R-10788	10/12/2001	Property	300	10	1,218	0	0	1,218	2,436	0	0	3,655	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1R-10789	10/12/2001	Property	300	10	6,090	0	0	12,182	0	12,182	0	24,364	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1R-10790	10/12/2001	Planer Shop	300	10	2,436	0	0	0	7,309	0	0	7,309	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1R-10791	10/12/2001	Planer Shop	300	10	609	0	0	609	0	0	0	609	1	0	0	0	609	0	0	609	1	0	0	0	0	0	0	0	0	0	0
1R-10792	10/12/2001	Planer Shop	300	10	6,090	6,091	0	18,273	30,455	6,091	6,091	67,000	11	0	0	0	0	6,091	0	6,091	1	0	0	0	0	0	0	0	0	0	0

Notes and Definitions:
The report excludes all lab quality control results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.
LA = Libby Amphibole
C = Chrysotile
OA = Other Amphibole
cm² = square centimeter
s/cm² = Structures per square centimeter
< = less than
> = greater than
u = micron

Table 2-10. Area 1 Removal-related Soil Sample Results – October 2001

Sample ID	Sample Date	Category	Parent ID	Matrix	Sample Group	Location Description (Sub Location)	Sample Type	Number of Subsamples	Top Depth (inches)	Bottom Depth (inches)	Analytical Results			
											Method	LA Bin	LA (%)	C (%)
1R-11541	10/4/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	01-01	Composite	5	16	18	PLM-9002	B	< 1	ND
1R-11542	10/4/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	Split of PB-01-02	Composite	5	16	18	PLM-9002	B	< 1	ND
1R-11543	10/4/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	Split of PB-01-03	Composite	5	16	18	PLM-9002	B	< 1	ND
1R-11544	10/4/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	From bottom of trench; Split of PB-01-04	Composite	5	48	50	PLM-9002	B	< 1	ND
1R-11545	10/4/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	Split of PB-01-05	Composite	5	18	20	PLM-9002	B	< 1	ND
1R-11546	10/4/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	Split of LW-01-01	Composite	3	16	18	PLM-9002	B	< 1	ND
1R-11547	10/4/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	Split of LW-01-02	Composite	2	16	18	PLM-9002	B	< 1	ND
1R-11548	10/4/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	Split of LW-01-03	Composite	5	16	18	PLM-9002	B	< 1	ND
1R-11549	10/4/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	Split of LW-01-04	Composite	5	16	18	PLM-9002	B	< 1	ND
1R-11550	10/4/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	Split of LW-01-05	Composite	5	18	20	PLM-9002	B	< 1	ND
1R-11551	10/4/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	100 foot by 100 foot grid; Split of LW-01-	Composite	5	16	18	PLM-9002	B	< 1	ND
1R-11552	10/4/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	warehouse; Split of LW-01-07	Composite	5	44	46	PLM-9002	B	< 1	ND
1R-11553	10/4/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	Split of SB-01-01	Composite	4	48	50	PLM-9002	B	< 1	ND
1R-11554	10/4/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	Split of SB-01-02	Composite	4	48	50	PLM-9002	B	< 1	ND
1R-11555	10/5/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	Split of EB-01-01	Composite	4	16	18	PLM-9002	B	< 1	ND
1R-11556	10/5/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	Split of EB-01-02	Composite	4	16	18	PLM-9002	B	< 1	ND
1R-11557	10/5/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	Split of EB-01-03	Composite	4	16	18	PLM-9002	B	< 1	ND
1R-11558	10/5/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	Split of EB-01-04	Composite	4	16	18	PLM-9002	B	< 1	ND
1R-11559	10/5/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	Split of EB-01-05	Composite	5	16	18	PLM-9002	B	< 1	ND
1R-11560	10/5/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	Split of EB-01-06	Composite	5	16	18	PLM-9002	B	< 1	ND
1R-11601	10/5/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	Split of EB-01-07	Composite	5	16	18	PLM-9002	B	< 1	ND
1R-11602	10/5/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	Split of SS-01-01	Composite	5	16	18	PLM-9002	B	< 1	ND
1R-11603	10/5/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	Split of BN-01-01	Composite	5	16	18	PLM-9002	B	< 1	ND
1R-11604	10/9/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of G-01-01	Composite	5	0	2	PLM-9002	A	ND	ND
1R-11605	10/9/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of G-01-02	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11606	10/9/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of H-01-01	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11607	10/9/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of H-01-02	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11608	10/9/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of H-01-03	Composite	5	0	2	PLM-9002	A	ND	ND
1R-11609	10/9/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of H-01-04	Composite	5	0	2	PLM-9002	A	ND	ND
1R-11610	10/9/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of H-01-05	Composite	5	0	2	PLM-9002	A	ND	ND
1R-11611	10/9/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of P-01-01	Composite	5	0	2	PLM-9002	A	ND	ND
1R-11612	10/9/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of P-01-02	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11613	10/9/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of P-01-03	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11614	10/9/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of P-01-04	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11615	10/9/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of Q-01-01	Composite	5	0	2	PLM-9002	A	ND	ND
1R-11616	10/9/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of Q-01-02	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11617	10/9/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of Q-01-03	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11618	10/9/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of Q-01-04	Composite	5	0	2	PLM-9002	A	ND	ND
1R-11619	10/9/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of Q-01-05	Composite	5	0	2	PLM-9002	A	ND	ND
1R-11620	10/9/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of Y-01-01	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11901	10/9/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of Z-01-01	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11903	10/10/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of ABA-01-01	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11904	10/10/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of AC-01-01	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11905	10/10/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of CD-01-02	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11906	10/10/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of DG-01-01	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11907	10/10/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of E-01-01	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11908	10/10/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of E-01-02	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11909	10/10/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of L01-01	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11910	10/10/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of IS-01-01	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11911	10/10/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of N-01-01	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11912	10/10/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of N-01-02	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11913	10/10/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of N-01-03	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11914	10/10/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of N-01-04	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11915	10/10/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of N-01-05	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11916	10/10/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of W-01-01	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11917	10/10/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of W-01-02	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11918	10/10/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of W-01-03	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11919	10/10/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of X-01-01	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-11920	10/10/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of X-01-02	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-12121	10/10/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of X-01-03	Composite	5	0	2	PLM-9002	B	< 1	ND

Table 2-10. Area 1 Removal-related Soil Sample Results – October 2001

Sample ID	Sample Date	Category	Parent ID	Matrix	Sample Group	Location Description (Sub Location)	Sample Type	Number of Subsamples	Top Depth (inches)	Bottom Depth (inches)	Analytical Results			
											Method	LA Bin	LA (%)	C (%)
1R-12122	10/10/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of X-01-04	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-12123	10/10/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Split of X-01-05	Composite	5	0	2	PLM-9002	B	< 1	ND
1R-12124	10/16/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Surface from non impacted areas	Composite	5	0	2	PLM-9002	A	ND	ND
1R-12125	10/16/2001	Split of W.R. Grace Field Sample		Surface soil	Property	side of site	Composite	5	0	2	PLM-9002	A	ND	ND
1R-12126	10/16/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Surface from non impacted areas	Composite	5	0	2	PLM-9002	A	ND	ND
1R-12127	10/16/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Surface from non impacted area	Composite	5	0	2	PLM-9002	A	ND	ND
1R-12128	10/16/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Surface from non impacted area	Composite	5	0	2	PLM-9002	A	ND	ND
1R-12129	10/16/2001	Split of W.R. Grace Field Sample		Surface soil	Property	Surface from non impacted area	Composite	5	0	2	PLM-9002	A	ND	ND
1R-12130	10/16/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	Depth from impacted area	Grab	---	8	10	PLM-9002	B	< 1	ND
1R-12131	10/16/2001	Split of W.R. Grace Field Sample		Subsurface soil	Property	Depth from non impacted area	Grab	---	8	10	PLM-9002	B	< 1	ND

Notes and Definitions:

The report excludes all lab quality control results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.

LA = Libby Amphibole

C = Chrysotile

ND = non-detect

PLM = polarized light microscopy

PLM-9002 = National Institute for Occupational Safety and Health 9002 method

% = percent

< = less than

Table 2-11. Area 1 Removal-related Personal Air Sample Results – September and October 2001

Sample ID	Task	Volume (L)	Sample Date	METHOD - ISO 10312 (s/cc)										PCM (NIOSH 7400) (f/cc)	AHERA					
				Grid Openings	Analytical Sensitivity	Libby Amphiboles (LA)									Total Concentration LA	Total Count LA	Libby Amphiboles (LA)			
						Excluded Structures			Structures Detected			S <5u	S >5u				Analytical Sensitivity (s/cc)	Asbestos Concentration (s/cc)		
						Aspect Ratio < 5:1	Length < 0.5 u	Diameter > 0.5u	Length 0.5 to 5 u	Length 5 to 10 u	Length > 10 u									
1R-09084	Labor - Removing roof	710	9/5/2001	10	0.0054	0.0054	0	0.0488	0.0163	0	0.0054	0.0759	14	0.099	Not analyzed by AHERA					
1R-09969	Decon roof	612	9/6/2001	10	0.0057	0	0	0.0057	0.0229	0.0057	0	0.0343	6	NA	Not analyzed by AHERA					
1R-09970	Decon roof	50	9/6/2001	10	0.0700	0	0	0	0	0	0	0	0	NA	Not analyzed by AHERA					
1R-09978	Operate - Excavator	700	9/7/2001	10	0.0090	0	0	0	0	0	0	0	0	<0.008	0	0	0.00426	<0.00426		
1R-09979	Operate - Excavator	66	9/7/2001	10	0.0956	0	0	0	0	0	0	0	0	<0.041	0	0	0.004522	<0.004522		
1R-10089	Spray down	765	9/10/2001	10	0.0083	0	0	0	0	0	0	0	0	0.02	1	1	UNK	0.00975		
1R-10090	Spray down	46	9/10/2001	10	0.1372	0	0	0	0	0	0	0	0	0.064	0	0	0.06488	<0.06488		
1R-10150	Removing sheet metal	737	9/11/2001	10	0.0086	0	0	0	0	0	0	0	0	0.043	3	3	UNK	0.02700		
1R-10167	Watering	690	9/12/2001	10	0.2735	0	0	0	0	0	0	0	0	<0.105	0	0	0.11639	<0.11639		
1R-10098	Drive - Truck	716	9/13/2001	10	0.0088	0	0	0.0176	0	0.0088	0.0088	0.0353	4	0.058	0	7	0.00051	0.03242		
1R-10101	Follow trucks	32	9/13/2001	10	0.1972	0	0	0	0	0	0	0	0	0.13	0	0	0.09327	<0.09327		
1R-10115	Operate - Excavator	686	9/14/2001	10	0.0092	0	0	0	0	0	0	0	0	0.011	2	2	UNK	0.02010		
1R-10118	Follow trucks	62	9/14/2001	10	0.1018	0	0	0	0	0	0	0	0	0.119	0	0	0.04814	<0.04814		
1R-10552	Watering down	652	9/17/2001	10	0.0097	0	0	0.0194	0	0	0	0.0194	2	0.021	0	0	0.00458	<0.00458		
1R-10564	Drive - Truck	686	9/18/2001	10	0.0092	0	0	0.0184	0.0092	0.0092	0	0.0368	4	0.081	4	3	0.00054	0.03384		
1R-10580	Watering debris	738	9/19/2001	10	0.0086	0	0	0.0085	0.0085	0	0	0.0171	2	0.012	0	1	0.00040	0.00404		
1R-10675	Decon wash	696	9/20/2001	10	0.0091	0	0	0.0091	0.0091	0.0091	0	0.0272	3	0.023	2	1	0.00043	0.01286		
1R-10689	Watering debris	716	9/21/2001	10	0.0088	0	0	0	0	0	0	0	0	0.011	0	0	0.00963	<0.00963		
1R-10723	Decon wash	657	9/22/2001	10	0.0096	0	0	0	0	0	0	0	0	0.038	7	3	UNK	0.04543		
1R-10739	Drive - Truck	763	9/24/2001	10	0.0083	0	0	0	0	0	0	0	0	0.186	8	11	0.00061	0.09290		
1R-10755	Watering debris	636	9/25/2001	10	0.0099	0	0	0.0099	0	0	0	0.0099	1	0.006	0	1	0.00047	0.00469		
1R-11211	Wash Truck	667	9/26/2001	10	0.0095	0	0	0	0.0284	0	0.0095	0.0378	4	0.021	2	1	0.00055	0.01492		
1R-11227	Watering debris	649	9/27/2001	10	0.0054	0	0	0	0	0	0	0	0	0.007	0	1	UNK	0.00461		
1R-11263	Operate - Excavator	713	9/28/2001	10	0.0049	0	0	0	0	0	0	0	0	0.004	0	0	0.00465	<0.00465		
1R-11277	Drive - Truck	858	9/29/2001	10	0.0171	0	0	0.0171	0.0512	0	0	0.0682	4	NA	0	0	UNK	UNK		
1R-11496	Drive - Truck	1373	10/2/2001	10	0.0025	0.0025	0	0	0.0127	0	0	0.0153	6	0.011	0	0	0.00435	<0.00435		
1R-11513	Decon trucks	679	10/3/2001	10	0.0052	0.0258	0	0.0052	0	0.0052	0	0.0361	7	0.051	1	3	0.00054	0.01954		
1R-11528	Operate - Excavator	770	10/4/2001	10	0.0045	0	0	0	0	0	0.0045	0.0045	1	0.019	0	2	0.00061	0.00969		
1R-11583	Drive - Truck	876	10/5/2001	10	0.0040	0.0240	0	0.0320	0.0360	0	0	0.0919	23	NA	0	0	UNK	UNK		
1R-11596	Drive - Haul truck	788	10/8/2001	10	0.0044	0.0044	0	0.0089	0.0222	0.0133	0	0.0489	11	0.041	0	0	0.00473	<0.00473		
1R-11651	Decon of haul trucks	821	10/9/2001	Not analyzed by ISO 10312										0.059	0	0	0.00454	<0.00454		
1R-11630	Drive - Truck	693	10/10/2001	Not analyzed by ISO 10312										0.083	0	0	0.00479	<0.00479		
1R-10830	Decon	461	10/17/2001	Not analyzed by ISO 10312										0.028	1	1	UNK	0.01289		
1R-10831	Decon	82	10/17/2001	Not analyzed by ISO 10312										0.051	0	0	0.03640	<0.03640		
1R-10833	Decon	461	10/17/2001	Not analyzed by ISO 10312										0.07	2	2	UNK	0.02578		
1R-10834	Decon	85	10/17/2001	Not analyzed by ISO 10312										0.231	0	1	UNK	0.03511		

Notes and Definitions:

The report excludes all lab quality control results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.

AHERA = asbestos hazardemergency response act

LA = Libby Amphibole

PCM = Phase contrast microscopy

NIOSH 7400 = National Institute for Occupational Safety and Health method 7400

ISO 10312 = International Organization of Standards Method 10312

S = structure

UNK = unknown

L = liters

cm2 = square centimeter

s/cc = Structures per cubic centimeter

f/cc = fibers per cubic centimeter

< = less than

> = greater than

u = micron

Table 2-12 - Area 1 Investigation Bulk Materials Sample Results – April 2002

Sample ID	Sample Date	Sample Group	Analytical Results			
			Method	LA (%)	C (%)	
1-06787	4/9/2002	Lumber Yard	PLM-9002	ND	ND	
1-06788	4/9/2002	Lumber Yard	PLM-9002	ND	ND	

Notes and Definitions:

The report excludes all lab quality control results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.

LA = Libby Amphibole

C = Chrysotile

ND = non-detect

PLM = polarized light microscopy

PLM-9002 = National Institute for Occupational Safety and Health 9002 method

% = percent

Table 2-13. Area 1 Investigation Soil Sample Results – May 2002

Sample ID	Sample Date	Category	Parent ID	Matrix	Sample Group	Location Description (Sub Location)	Sample Type	Number of Subsamples	Top Depth (inches)	Bottom Depth (inches)	Analytical Results			
											Method	LA Bin	LA (%)	C (%)
1R-13766	5/8/2002	Field Sample		Surface soil	Property	Area surrounding connex boxes	Composite	3	0	2	PLM-9002	B	<1	ND
1R-13767	5/8/2002	Field Sample		Surface soil	Property	Area near railroad tracks	Composite	3	0	1	PLM-9002	B	<1	ND

Notes and Definitions:

The report excludes all lab quality control results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.

LA = Libby Amphibole

ND = non-detect

% = percent

C = Chrysotile

PLM = polarized light microscopy

PLM-9002 = National Institute for Occupational Safety and Health 9002 method

< = less than

Table 2-14. Area 1 Removal-related Soil Sample Results – December 2002

Sample ID	Sample Date	Category	Parent ID	Matrix	Sample Group	Location Description (Sub Location)	Sample Type	Number of Subsamples	Top Depth (inches)	Bottom Depth (inches)	Analytical Results			
											Method	LA Bin	LA (%)	C (%)
1R-13769	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-1	Composite	5	18	20	PLM-9002	B	< 1	ND
1R-13770	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-2	Composite	5	18	20	PLM-9002	B	< 1	ND
1R-13771	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-3	Composite	5	18	20	PLM-9002	B	< 1	ND
1R-13772	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-4	Composite	5	18	20	PLM-9002	A	ND	ND
1R-13773	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-5	Composite	5	18	20	PLM-9002	B	< 1	ND
1R-13774	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-6	Composite	5	18	20	PLM-9002	B	< 1	ND
1R-13775	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-7	Composite	5	18	20	PLM-9002	B	< 1	ND
1R-13776	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-8	Composite	5	18	20	PLM-9002	A	ND	ND
1R-13777	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-9	Composite	5	18	20	PLM-9002	A	ND	ND
1R-13778	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-10	Composite	5	18	20	PLM-9002	B	< 1	ND
1R-13779	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-11	Composite	5	72	74	PLM-9002	B	< 1	ND
1R-13780	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-12	Composite	5	18	20	PLM-9002	A	ND	ND
1R-17381	12/3/2002	W.R. Grace Field		Subsurface soil	Property	EXP-13	Composite	5	18	20	PLM-9002		*	*
1R-17382	12/3/2002	W.R. Grace Field		Subsurface soil	Property	EXP-14	Composite	5	18	20	PLM-9002		*	*
1R-17383	12/3/2002	W.R. Grace Field		Subsurface soil	Property	EXP-15	Composite	5	18	20	PLM-9002		*	*
1R-17384	12/3/2002	W.R. Grace Field		Subsurface soil	Property	EXP-16	Composite	5	18	20	PLM-9002		*	*
1R-17385	12/3/2002	W.R. Grace Field		Subsurface soil	Property	EXP-17	Composite	5	18	20	PLM-9002		*	*
1R-17386	12/3/2002	W.R. Grace Field		Subsurface soil	Property	EXP-18	Composite	5	18	20	PLM-9002		*	*
1R-17387	12/3/2002	W.R. Grace Field		Subsurface soil	Property	EXP-19	Composite	5	18	20	PLM-9002		*	*
1R-17388	12/3/2002	W.R. Grace Field		Subsurface soil	Property	EXP-20	Composite	5	18	20	PLM-9002		*	*
1R-17389	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-21	Composite	5	18	20	PLM-9002	A	ND	ND
1R-17390	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-22	Composite	5	18	20	PLM-9002	B	< 1	ND
1R-17391	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-23	Composite	5	18	20	PLM-9002	A	ND	ND
1R-17392	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-24	Composite	5	18	20	PLM-9002	A	ND	ND
1R-17393	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-25	Composite	5	18	20	PLM-9002	A	ND	ND
1R-17394	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-41	Composite	5	36	38	PLM-9002	B	< 1	ND
1R-17395	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-27	Composite	5	18	20	PLM-9002	B	< 1	ND
1R-17396	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-29	Composite	5	18	20	PLM-9002	B	< 1	ND
1R-17397	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-32	Composite	5	18	20	PLM-9002	A	ND	ND
1R-17398	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-36	Composite	5	18	20	PLM-9002	A	ND	ND
1R-17399	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-40	Composite	5	18	20	PLM-9002	A	ND	ND
1R-17400	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-39	Composite	5	18	20	PLM-9002	A	ND	ND
1R-17401	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-38	Composite	5	18	20	PLM-9002	B	< 1	ND
1R-17402	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-37	Composite	5	18	20	PLM-9002	A	ND	ND
1R-17403	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-33	Composite	5	18	20	PLM-9002	A	ND	ND
1R-17404	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-34	Composite	5	18	20	PLM-9002	A	ND	ND
1R-17405	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-35	Composite	5	18	20	PLM-9002	A	ND	ND
1R-17406	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-31	Composite	5	18	20	PLM-9002	B	< 1	ND
1R-17407	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-30	Composite	5	18	20	PLM-9002	A	ND	ND
1R-17408	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-28	Composite	5	18	20	PLM-9002	A	ND	ND
1R-17409	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Exp-26	Composite	5	18	20	PLM-9002	A	ND	ND
1R-17410	12/3/2002	W.R. Grace Field		Subsurface soil	Property	Driveway	Composite	5	18	20	PLM-9002	A	ND	ND
1R-17411	12/3/2002	W.R. Grace Field		Subsurface soil	Driveway	Drive on S side of site	Composite	5	18	20	PLM-9002	A	ND	ND
1R-17412	12/3/2002	W.R. Grace Field		Subsurface soil	Property/Excava	Bottom of Waterline Hole	Composite	5	120	122	PLM-9002	A	ND	ND

The report excludes all lab quality control results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.

W.R. Grace = W.R. Grace and Company

LA = Libby Amphibole

C = Chrysotile

ND = non-detect

PLM = polarized light microscopy

PLM-9002 = National Institute for Occupational Safety and Health 9002 method

% = percent

< = less than

* = archived samples; results not available

CDM

P:\2616-Libby\Task Order 0015 - Processing Areas and Investigation Support\Processing Areas\OU1\Remedial Investigation Report\Final\Tables\Table 2-14 final SOIL December 2002 (removal).xls

Table 2-14

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Table 2-15. Area 1 Removal-related Personal Air Sample Results – October/December 2002

Sample ID	Task	Volume (L)	Sample Date	PCM (NIOSH 7400) (f/cc)	
1R-15806	Hepa vac/wiping down	344	10/7/2002		0.166
1R-15809	Hepa vac/wiping down	416	10/8/2002		0.492
1R-15811	Hepa vac/wiping down	70	10/8/2002		0.238
1R-15745	Cleaning	362	10/9/2002		0.026
1R-15746	Cleaning	329	10/9/2002		0.031
1R-15747	Cleaning	65	10/9/2002		0.151
1R-15752	Cleaning	337	10/10/2002		0.362
1R-15889	Cleaning	362	10/11/2002		0.014
1R-15890	Cleaning	63	10/11/2002	<	0.043
1R-15891	Cleaning	166	10/11/2002	<	0.016

Notes and Definitions:

The report excludes all lab quality control results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, et
NIOSH 7400 = National Institute for Occupational Safety and Health method 7400

PCM = Phase contrast microscopy

L = liters

f/cc = fibers per cubic centimeter

< = less than

Table 2-16. Area 1 Investigation Soil Sample Results – June 2006

Sample ID	Sample Date	Category	Parent ID	Matrix	Sample Group	Location Description (Sub Location)	Sample Type	Number of Subsamples	Top Depth (inches)	Bottom Depth (inches)	Analytical Results			
											Method	LA Bin	LA (%)	C (%)
1-08278-B	6/9/2006	Field Sample		Surface soil	Stockpile	Field	Composite	5	0	2	PLM-9002	B2	< 1	ND
1-08279-B	6/9/2006	Field Sample		Surface soil	Stockpile	Field	Composite	5	0	2	PLM-9002	A	ND	ND
1-08280-B	6/9/2006	Field Sample		Surface soil	Stockpile	Field	Composite	5	0	2	PLM-9002	A	ND	ND
1-08281-B	6/9/2006	Field Sample		Surface soil	Stockpile	Field	Composite	5	0	2	PLM-9002	A	ND	ND
1-08282-B	6/9/2006	Field Sample		Surface soil	Field	Field	Composite	5	0	2	PLM-9002	C	2	ND
1-08283-B	6/9/2006	Field Sample		Surface soil	Field	Field	Composite	5	0	2	PLM-9002	C	3	ND
1-08284-B	6/9/2006	Field Sample		Surface soil	Field	Field	Composite	5	0	2	PLM-9002	C	1	ND
1-08285-B	6/9/2006	Field Sample		Surface soil	Field	Field	Composite	5	0	2	PLM-9002	C	1	ND

Notes and Definitions:

The report excludes all lab quality control results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.

B suffix in Sample ID = non-processed sample

LA = Libby Amphibole

C = Chrysotile

ND = non-detect

% = percent

PLM = polarized light microscopy

PLM-9002 = National Institute for Occupational Safety and Health 9002 method

< = less than

Table 2-17. Area 1 Surface Soil Sample Results – September 2007

Sample ID	Sample Date	Category	Parent ID	Matrix	Sample Group	Location Description (Sub Location)	Sample Type	Number of Subsamples	Top Depth (inches)	Bottom Depth (inches)	Analytical Results		
											PLM-VE		
											LA Bin	LA (%)	C (%)
EP-00001	9/12/2007	Field Sample		Surface soil	Property	Former export plant area 1	Composite	30	0	3	A	ND	ND
EP-00026	9/18/2007	Field Sample		Surface soil	Property	Area 1 - 4	Composite	30	0	6	A	ND	ND
EP-00027	9/18/2007	Field Sample		Surface soil	Property	Area 1 - 3	Composite	30	0	6	A	ND	ND
EP-00028	9/18/2007	Field Sample		Surface soil	Property	Area 1 - 2	Composite	30	0	6	A	ND	ND
EP-00029	9/18/2007	Field Sample		Surface soil	Property	Area 1 - 9	Composite	30	0	6	A	ND	ND
EP-00030	9/18/2007	Field Sample		Surface soil	Property	Area 1 - 18	Composite	30	0	6	A	ND	ND
EP-00031	9/18/2007	Field Sample		Surface soil	Property	Area 1 - 17	Composite	30	0	6	A	ND	ND
EP-00032	9/18/2007	Field Sample		Surface soil	Property	Area 1 - 26	Composite	0	0	6	A	ND	ND
EP-00033	9/18/2007	Field Sample		Surface soil	Property	Area 1 - 16	Composite	30	0	6	A	ND	ND
EP-00034	9/18/2007	Field Duplicate	EP-00033	Surface soil	Property	Area 1 - 16	Composite	30	0	6	A	ND	ND
EP-00035	9/18/2007	Field Sample		Surface soil	Property	Area 1 - 35	Composite	30	0	6	B1	TR	ND
EP-00040	9/19/2007	Field Sample		Surface soil	Property	Area 1 - 11	Composite	30	0	6	B1	TR	ND
EP-00049	9/19/2007	Field Sample		Surface soil	Property	Area 1 - 6	Composite	30	0	6	B1	TR	ND
EP-00050	9/19/2007	Field Sample		Surface soil	Property	Area 1 - 5	Composite	30	0	6	B1	TR	ND
EP-00051	9/19/2007	Field Sample		Surface soil	Property	Area 1 - 12	Composite	30	0	6	B1	TR	ND
EP-00052	9/19/2007	Field Sample		Surface soil	Property	Area 1 - 10	Composite	30	0	6	A	ND	ND
EP-00055	9/19/2007	Field Sample		Surface soil	Property	Area 1 - 21	Composite	30	0	6	A	ND	ND
EP-00056	9/19/2007	Field Sample		Surface soil	Property	Area 1 - 20	Composite	30	0	6	A	ND	ND
EP-00057	9/19/2007	Field Sample		Surface soil	Property	Area 1 - 19	Composite	30	0	6	A	ND	ND
EP-00058	9/19/2007	Field Duplicate	EP-00057	Surface soil	Property	Area 1 - 19	Composite	30	0	6	A	ND	ND
EP-00059	9/20/2007	Field Sample		Surface soil	Property	Area 1-29	Composite	30	0	6	A	ND	ND
EP-00060	9/20/2007	Field Sample		Surface soil	Property	Area 1-37	Composite	30	0	6	A	ND	ND
EP-00061	9/20/2007	Field Sample		Surface soil	Property	Area 1-38	Composite	30	0	6	A	ND	ND
EP-00066	9/20/2007	Field Sample		Surface soil	Property	Area 1-39	Composite	30	0	6	B1	TR	ND
EP-00067	9/20/2007	Field Sample		Surface soil	Property	Area 1-30	Composite	30	0	6	A	ND	ND
EP-00068	9/20/2007	Field Sample		Surface soil	Property	Area 1-40	Composite	30	0	6	A	ND	ND
EP-00084	9/21/2007	Field Sample		Surface soil	Property	Area 1-24	Composite	30	0	6	B1	TR	ND
EP-00085	9/21/2007	Field Sample		Surface soil	Property	Area 1-22	Composite	30	0	6	A	ND	ND
EP-00086	9/21/2007	Field Sample		Surface soil	Property	Area 1-23	Composite	30	0	6	A	ND	ND
EP-00087	9/21/2007	Field Sample		Surface soil	Property	Area 1-13	Composite	30	0	6	B1	TR	ND
EP-00088	9/21/2007	Field Sample		Surface soil	Property	Area 1-27	Composite	30	0	6	A	ND	ND
EP-00089	9/21/2007	Field Sample		Surface soil	Property	Area 1-32	Composite	30	0	6	A	ND	ND
EP-00090	9/21/2007	Field Sample		Surface soil	Property	Area 1-15	Composite	30	0	6	A	ND	ND
EP-00091	9/21/2007	Field Sample		Surface soil	Property	Area 1-31	Composite	30	0	6	A	ND	ND
EP-00092	9/21/2007	Field Sample		Surface soil	Property	Area 1-14	Composite	30	0	6	A	ND	ND
EP-00093	9/21/2007	Field Duplicate	EP-00088	Surface soil	Property	Area 1-27	Composite	30	0	6	A	ND	ND
EP-00094	9/21/2007	Field Sample		Surface soil	Property	Area 1-28	Composite	30	0	6	B1	TR	ND
EP-00095	9/21/2007	Field Sample		Surface soil	Property	Area 1-33	Composite	30	0	6	B1	TR	ND
EP-00096	9/21/2007	Field Sample		Surface soil	Property	Area 1-36	Composite	30	0	6	B1	TR	ND
EP-00097	9/21/2007	Field Sample		Surface soil	Property	Area 1-34	Composite	30	0	6	A	ND	ND
EP-00098	9/21/2007	Field Sample		Surface soil	Property	Area 1-40	Composite	30	0	6	B1	TR	ND
EP-00099	9/21/2007	Field Sample		Surface soil	Property	Area 1-1	Composite	30	0	6	B1	TR	ND

Notes and Definitions:

The report excludes all lab quality control results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.

LA = Libby Amphibole

C = Chrysotile

ND = non-detect

TR = trace

PLM-VE = visual estimation method

PLM-Grav = gravimetric method

% = percent

< = less than

Table 2-18. Area 1 Indoor Activity Based Sampling Personal Air Sample Results – October/November 2007

Sample ID	Sample Date	Task	Volume (L)	Analytical Results (METHOD - ISO 10312) (Air = s/cc)																		
				Grid Openings	Libby Amphibole (LA)										Other Amphibole (OA)							
					Analytical Sensitivity	Excluded Structures			Structures Detected			Total Concentration LA	Total Count LA	Excluded Structures			Structures Detected			Total Concentration OA	Total Count OA	
						Aspect Ratio < 5:1	Length < 0.5 u	Diameter > 0.5u	Length 0.5 to 5 u	Length 5 to 10 u	Length > 10 u			Aspect Ratio < 5:1	Length < 0.5 u	Diameter > 0.5u	Length 0.5 to 5 u	Length 5 to 10 u	Length > 10 u			
EP-00102	10/30/2007	Active-garage	858	100	0.0027	0	0	0	0.0027	0	0	0.0027	1	0	0	0	0	0	0	0	0	
EP-00108	10/30/2007	Active-garage	272	100	0.0085	0	0	0.0085	0.0169	0.0169	0	0.0423	5	0	0	0	0	0	0	0	0	
EP-00109	10/30/2007	Active-garage	474	102	0.0238	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
EP-00110	10/30/2007	Active-garage	931	102	0.0121	0	0	0	0.0121	0	0	0.0121	1	0	0	0	0	0	0	0	0	
EP-00112	10/31/2007	Active-garage	468	100	0.0049	0.0098	0	0	0.0147	0	0	0.0246	5	0	0	0	0	0	0	0	0	
EP-00118	10/31/2007	Active-garage	624	102	0.0181	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
EP-00120	10/31/2007	Active-garage	329	100	0.0070	0.0140	0	0.0210	0.0140	0.0140	0.0070	0.0699	10	0	0	0	0	0	0	0	0	
EP-00121	10/31/2007	Active-garage	503	100	0.0046	0	0	0	0.0046	0	0	0.0046	1	0	0	0	0	0	0	0	0	
EP-00122	10/31/2007	Active-garage	553	100	0.0042	0.0042	0	0	0.0042	0	0	0.0083	2	0	0	0	0	0	0	0	0	
EP-00124	11/1/2007	Active-garage	326	100	0.0071	0.0071	0	0.0071	0	0	0.0071	0.0212	3	0	0	0	0	0	0	0	0	
EP-00131	11/1/2007	Active-garage	299	100	0.0077	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
EP-00132	11/1/2007	Active-garage	447	100	0.0051	0.0051	0	0	0.0154	0	0	0.0206	4	0	0	0	0	0	0	0	0	
EP-00133	11/1/2007	Active-garage	295	100	0.0195	0	0	0.0195	0	0	0	0.0195	1	0	0	0	0	0	0	0	0	
EP-00135	11/1/2007	Active-garage	410	100	0.0140	0	0	0	0.0280	0	0	0.0280	2	0	0	0	0	0	0	0	0	
EP-00136	11/1/2007	Active-garage	309	100	0.0186	0	0	0	0.0186	0	0	0.0186	1	0	0	0	0	0	0	0	0	
EP-00137	11/1/2007	Active-garage	339	100	0.0170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
EP-00142	11/7/2007	Passive-meeting room	1256	106	0.0003	0.0026	0	0	0	0	0.0053	0.0079	3	0	0	0	0	0	0	0	0	
EP-00147	11/7/2007	Active-meeting room	1256	105	0.0003	0	0	0.0005	0.0003	0	0.0003	0.0011	4	0	0	0	0	0	0	0	0	
EP-00162	11/6/2007	Passive-meeting room	1158	100	unk	0	0	0.0003	0	0	0	0.0003	1	0	0	0	0	0	0	0	0	
EP-00167	11/6/2007	Active-meeting room	1238	104	0.0010	0	0	0.0029	0.0039	0.0010	0.0010	0.0088	9	0	0	0	0	0	0	0	0	
EP-00170	11/8/2007	Passive-meeting room	1262	100	0.0003	0	0	0	0	0.0003	0	0.0003	1	0	0	0	0	0	0	0	0	
EP-00171	11/8/2007	Active-meeting room	1174	102	0.0003	0.0003	0	0.0006	0.0009	0.0003	0.0003	0.0023	8	0	0	0	0	0	0	0	0	

Notes and Definitions:

The report excludes all lab quality control results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.

LA = Libby Amphibole

C = Chrysotile

OA = Other Amphibole

ISO 10312 = International Organization of Standards 10312 method

s/cc = Structures per cubic centimeter

% = percent

< = less than

> = greater than

u = micron

unk - unknown

Table 2-19. Area 1 Investigation Dust Sample Results – October/November 2007

Sample ID	Sample Date	Location Description	Area (cm ²)	Grid Openings	Analytical Results (METHOD - ISO 10312) (Dust = s/cm ²)																
					Libby Amphibole (LA)								Other Amphibole (OA)								
					Analytical Sensitivity	Excluded Structures			Structures Detected			Total Concentration LA	Total Count LA	Excluded Structures			Structures Detected			Total Concentration OA	Total Count OA
						Aspect Ratio < 5:1	Length < 0.5 u	Diameter > 0.5u	Length 0.5 to 5 u	Length 5 to 10 u	Length > 10 u			Aspect Ratio < 5:1	Length < 0.5 u	Diameter > 0.5u	Length 0.5 to 5 u	Length 5 to 10 u	Length > 10 u		
EP-00106	10/30/2007	Garage	1000	29	19.82	0	0	0	20	0	0	20	1	0	0	0	0	0	0	0	0
EP-00115	10/31/2007	Garage	1000	12	19.16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EP-00128	11/1/2007	Garage	1000	12	19.16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EP-00145	11/7/2007	Meeting room	1000	10	12.58	0	0	0	25	25	25	75	6	0	0	0	0	0	0	0	0
EP-00165	11/6/2007	Meeting room	1000	10	6.29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EP-00174	11/8/2007	Meeting room	1000	10	6.29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EP-00104	10/30/2007	Vehicle	1000	29	19.82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EP-00113	10/31/2007	Vehicle	1000	15	15.33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EP-00127	11/1/2007	Vehicle	1000	12	19.16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Notes and Definitions:
The report excludes all lab quality control results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.
LA = Libby Amphibole
C = Chrysotile
OA = Other Amphibole
ISO 10312 = International Organization of Standards 10312 method
< = less than
> = greater than
u = micron
cm² = square centimeter
s/cm² = Structures per square centimeter

Table 2-20. Area 1 Investigation Personal Air Sample Results – September 2007

Sample ID	Volume (L)	Grid Openings	Analytical Results for LA (METHOD - ISO 10312) (Air = s/cc)									PCM (NIOSH 7400) (f/cc)
			Analytical Sensitivity	Excluded Structures			Structures Detected			Total Concentration LA	Total Count LA	
				Aspect Ratio <5:1	Length <0.5u	Diameter > 0.5u	Length 0.5 to 5 u	Length 5 to 10 u	Length >10u			
EP-00004	61	105	0.0046	0	0	0	0	0.0046	0	0.0046	1	<0.044
EP-00005	147	105	0.0019	0	0	0	0	0.0038	0	0.0038	2	0.033
EP-00006	184	105	0.0015	0	0	0	0	0	0	0	0	0.069
EP-00007	66	105	0.0043	0	0	0	0.0043	0	0	0.0043	1	0.059
EP-00013	138	105	0.0020	0.0061	0	0.0164	0.0102	0.0123	0.0266	0.0715	35	0.11
EP-00014	61	105	0.0046	0	0	0	0.0046	0	0	0.0046	1	<0.044
EP-00015	253	105	0.0011	0	0	0.0022	0.0033	0.0011	0.0022	0.0089	8	0.033
EP-00017	92	105	0.0031	0	0	0	0	0	0	0	0	0.032

Notes and Definitions:

The report excludes all lab quality control results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.

LA = Libby Amphibole

C = Chrysotile

OA = Other Amphibole

NIOSH 7400 = National Institute for Occupational Safety and Health method 7400

ISO 10312 = International Organization of Standards Method 10312

PCM = phase contrast microscopy

f/cc = fibers per cubic centimeter

L = liters

s/cc = Structures per cubic centimeter

u = micron

< = less than

> = greater than

Table 2-21. Area 2 Investigation Soil Sample Results – May/July 2003

Sample ID	Sample Date	Category	Parent ID	Matrix	Sample Group	Location Description (Sub Location)	Sample Type	Number of Subsamples	Top Depth (inches)	Bottom Depth (inches)	Analytical Results				
											Method	LA Bin	LA (%)	C (%)	
1-07851	5/22/2003	Field Sample		Surface soil	Property	On ramp-concrete pad area closest to river	Composite	5	0	1	PLM-9002	A	ND		ND
1-07852	5/22/2003	Field Sample		Surface soil	Property	On ramp-middle asphalt area	Composite	5	0	1	PLM-9002	A	ND		ND
1-07853	5/22/2003	Field Sample		Surface soil	Property	On ramp-top asphalt area	Composite	5	0	1	PLM-9002	A	ND		ND
1-07731-FG1	7/19/2003	Field Sample		Surface soil	Driveway	north and south edges of concrete pad	Composite	5	0	6	PLM-VE	B2	< 1		ND
1-07732-FG1	7/19/2003	Field Sample		Surface soil	Driveway	east of concrete pad	Composite	5	0	6	PLM-VE	B1	TR		ND

Notes and Definitions:

The report excludes all lab quality control results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.

FG1 suffix in Sample ID = fine ground sample portion

LA = Libby Amphibole

C = Chrysotile

ND = non-detect

TR = trace

PLM = polarized light microscopy

PLM-9002 = National Institute for Occupational Safety and Health 9002 method

PLM-VE = visual estimation method

% = percent

< = less than

Table 2-22. Area 2 Pre-removal Soil Sample Results – September/October 2003

Sample ID	Sample Date	Category	Parent ID	Matrix	Sample Group	Location Description (Sub Location)	Sample Type	Number of Subsamples	Top Depth (inches)	Bottom Depth (inches)	Analytical Results			
											Method	LA Bin	LA (%)	C (%)
CS-16698-FG	9/10/2003	Field Sample		Subsurface soil	Park	Area TP1	Grab		36	38	PLM-VE	A	ND	ND
CS-16699-FG	9/10/2003	Field Sample		Subsurface soil	Park	Area TP2	Grab		36	39	PLM-VE	A	ND	ND
CS-16700-FG	9/10/2003	Field Sample		Subsurface soil	Park	Area TP3	Grab		14	16	PLM-VE	A	ND	ND
CS-16821-FG	9/10/2003	Field Sample		Subsurface soil	Park	Area TP3A	Grab		36	38	PLM-VE	A	ND	ND
CS-16835-FG	9/12/2003	Field Sample		Subsurface soil	Park	TP4	Grab		36	38	PLM-VE	A	ND	ND
CS-16836-FG	9/12/2003	Field Sample		Subsurface soil	Park	TP4-A	Grab		36	38	PLM-VE	A	ND	ND
CS-16837-FG	9/12/2003	Field Sample		Subsurface soil	Park	TP5	Grab		12	18	PLM-VE	A	ND	ND
CS-16838-FG	9/12/2003	Field Sample		Subsurface soil	Park	TP8	Grab		36	38	PLM-VE	A	ND	ND
CS-16839-FG	9/12/2003	Field Sample		Subsurface soil	Park	TP6	Grab		36	38	PLM-VE	B1	TR	ND
CS-16840-FG	9/12/2003	Field Duplicate	CS-16839	Subsurface soil	Park	TP6	Grab		36	38	PLM-VE	B1	TR	ND
CS-16841-FG	9/12/2003	Field Sample		Subsurface soil	Park	TP11	Grab		36	38	PLM-VE	A	ND	ND
CS-16842-FG	9/12/2003	Field Sample		Subsurface soil	Park	TP1A	Grab		36	38	PLM-VE	A	ND	ND
CS-16843-FG	9/12/2003	Field Sample		Subsurface soil	Park	TP10	Grab		36	38	PLM-VE	A	ND	ND
CS-16844-FG	9/12/2003	Field Sample		Subsurface soil	Park	TP9	Grab		12	14	PLM-VE	A	ND	ND
CS-16845-FG	9/12/2003	Field Sample		Subsurface soil	Park	TP7	Grab		14	16	PLM-VE	A	ND	ND
CS-16846-FG	9/12/2003	Field Sample		Subsurface soil	Park	TP6A	Grab		36	38	PLM-VE	A	ND	ND
CS-17477-B	10/23/2003	Field Sample		Subsurface soil	Park	Test pit 12	Grab		35	38	PLM-9002	A	ND	ND
CS-17477-FG1	10/23/2003	Field Sample		Subsurface soil	Park	Test pit 12	Grab	---	35	38	PLM-VE	B1	TR	ND

Notes and Definitions:

The report excludes all lab quality control results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.

FG/FG1 suffix in Sample ID = fine ground sample portion

LA = Libby Amphibole

C = Chrysotile

ND = non-detect

TR = trace

% = percent

PLM = polarized light microscopy

PLM-VE = visual estimation method

< = less than

Table 2-23. Area 2 Removal-related Soil Sample Results – October/November 2003

Sample ID	Sample Date	Category	Parent ID	Matrix	Sample Group	Location Description (Sub Location)	Sample Type	Number of Subsamples	Top Depth (inches)*	Bottom Depth (inches)*	Analytical Results			
											Method	LA Bin	LA (%)	C (%)
1R-23244-B	10/2/2003	Field Sample		Surface soil	Park	Grid 38	Composite	5	36	38	PLM-9002	B2	< 1	ND
1R-21994-B	10/6/2003	Field Sample		Surface soil	Park	Grid 37	Composite	5	36	38	PLM-9002	A	ND	ND
1R-21995-B	10/6/2003	Field Sample		Surface soil	Park	Grid 53	Composite	5	36	38	PLM-9002	B2	< 1	ND
1R-21996-B	10/7/2003	Field Sample		Surface soil	Park	discretion of the CDM site manager	Composite	5	36	38	PLM-9002	B2	< 1	ND
1R-21997-B	10/7/2003	Field Sample		Surface soil	Park	Grids 34/35	Composite	5	36	38	PLM-9002	B2	< 1	ND
1R-21998-B	10/7/2003	Field Sample		Surface soil	Park	Grid 53	Composite	6	36	38	PLM-9002	B2	< 1	ND
1R-21999-B	10/8/2003	Field Sample		Surface soil	Park	Grid 32	Composite	5	12	14	PLM-9002	A	ND	ND
1R-22000-B	10/8/2003	Field Sample		Surface soil	Park	Grid 36	Composite	5	12	14	PLM-9002	A	ND	ND
1R-23245-B	10/8/2003	Field Sample		Surface soil	Park	Grid 33	Composite	5	36	38	PLM-9002	A	ND	ND
1R-23246-B	10/9/2003	Field Sample		Surface soil	Park	Grid 31	Composite	5	12	14	PLM-9002	A	ND	ND
1R-23247-B	10/9/2003	Field Sample		Surface soil	Park	Grid 30	Composite	5	12	14	PLM-9002	A	ND	ND
1R-23248-B	10/9/2003	Field Sample		Surface soil	Park	south of dirt approach to new boat ramp	Composite	5	12	14	PLM-9002	A	ND	ND
1R-23249-B	10/13/2003	Field Sample		Surface soil	Park	Grid 29	Composite	5	12	14	PLM-9002	A	ND	ND
1R-23250-B	10/13/2003	Field Sample		Surface soil	Park	Grid 28	Composite	5	12	14	PLM-9002	A	ND	ND
1R-23251-B	10/13/2003	Field Sample		Surface soil	Park	Grid 27	Composite	5	36	38	PLM-9002	A	ND	ND
1R-23252-B	10/13/2003	Field Sample		Surface soil	Park	Grid 52	Composite	5	36	38	PLM-9002	A	ND	ND
1R-23253-B	10/15/2003	Field Sample		Surface soil	Park	Grid 26	Composite	5	12	14	PLM-9002	A	ND	ND
1R-23254-B	10/15/2003	Field Sample		Surface soil	Park	Grid 25	Composite	5	12	14	PLM-9002	A	ND	ND
1R-23255-B	10/15/2003	Field Sample		Surface soil	Park	Grid 23/24	Composite	5	36	38	PLM-9002	B2	< 1	ND
1R-23256-B	10/15/2003	Field Sample		Surface soil	Park	Grid 52	Composite	5	36	38	PLM-9002	A	ND	ND
1R-23257-B	10/16/2003	Field Sample		Surface soil	Park	Grids 19/20	Composite	5	36	38	PLM-9002	B2	< 1	ND
1R-23258-B	10/16/2003	Field Sample		Surface soil	Park	Grid 51	Composite	5	36	38	PLM-9002	B2	< 1	ND
1R-23259-B	10/20/2003	Field Sample		Surface soil	Park	Grid 16	Composite	5	36	38	PLM-9002	A	ND	ND
1R-23260-B	10/20/2003	Field Sample		Surface soil	Park	Grid 51	Composite	5	36	38	PLM-9002	A	ND	ND
1R-23741-B	10/20/2003	Field Sample		Surface soil	Park	Grid 13	Composite	5	36	38	PLM-9002	B2	< 1	ND
1R-23742-B	10/20/2003	Field Sample		Surface soil	Park	Grid 50	Composite	5	36	38	PLM-9002	A	ND	ND
1R-23743-B	10/20/2003	Field Sample		Surface soil	Park	Grid 10	Composite	5	36	38	PLM-9002	B2	< 1	ND
1R-23744-B	10/20/2003	Field Sample		Surface soil	Park	Grid 50	Composite	5	36	38	PLM-9002	A	ND	ND
1R-23745-B	10/22/2003	Field Sample		Surface soil	Park	Grid 49	Composite	5	36	38	PLM-9002	A	ND	ND
1R-23746-B	10/22/2003	Field Sample		Surface soil	Park	Grid 49	Composite	5	36	38	PLM-9002	B2	< 1	ND
1R-23751-B	10/23/2003	Field Sample		Surface soil	Park	Grid 7	Composite	5	36	38	PLM-9002	A	ND	ND
1R-23752-B	10/23/2003	Field Sample		Surface soil	Park	Grid 4	Composite	5	36	38	PLM-9002	A	ND	ND
1R-23753-B	10/24/2003	Field Sample		Surface soil	Park	Grid 1	Composite	5	30	32	PLM-9002	B2	< 1	ND
1R-23754-B	10/24/2003	Field Sample		Surface soil	Park	Grid 49	Composite	5	36	38	PLM-9002	B2	< 1	ND
1R-23755-B	10/27/2003	Field Sample		Surface soil	Park	Grid 2	Composite	5	18	20	PLM-9002	A	ND	ND
1R-23756-B	10/27/2003	Field Sample		Surface soil	Park	Grid 3	Composite	5	12	14	PLM-9002	A	ND	ND
1R-23757-B	10/27/2003	Field Sample		Surface soil	Park	Grid 6	Composite	5	12	14	PLM-9002	A	ND	ND
1R-23758-B	10/27/2003	Field Sample		Surface soil	Park	Grid 5	Composite	5	24	26	PLM-9002	A	ND	ND
1R-23759-B	10/28/2003	Field Sample		Surface soil	Park	Grid 9	Composite	5	12	14	PLM-9002	A	ND	ND
1R-23760-B	10/28/2003	Field Sample		Surface soil	Park	Grid 8	Composite	5	24	26	PLM-9002	A	ND	ND
1R-24081-B	10/28/2003	Field Sample		Surface soil	Park	Grid 12	Composite	5	12	14	PLM-9002	A	ND	ND
1R-24082-B	10/28/2003	Field Sample		Surface soil	Park	Grid 11	Composite	5	18	20	PLM-9002	A	ND	ND
1R-24083-B	10/28/2003	Field Sample		Surface soil	Park	Grid 36	Composite	5	12	14	PLM-9002	A	ND	ND
1R-24084-B	10/29/2003	Field Sample		Surface soil	Park	Grid 15	Composite	5	12	14	PLM-9002	A	ND	ND
1R-24085-B	10/29/2003	Field Sample		Surface soil	Park	Grid 14	Composite	5	18	20	PLM-9002	A	ND	ND
1R-24086-B	10/30/2003	Field Sample		Surface soil	Park	Grid 36	Composite	5	12	14	PLM-9002	B2	< 1	ND
1R-24087-B	10/31/2003	Field Sample		Surface soil	Park	Grid 18	Composite	5	18	20	PLM-9002	A	ND	ND
1R-24088-B	10/31/2003	Field Sample		Surface soil	Park	Grid 17	Composite	5	18	20	PLM-9002	A	ND	ND
1R-24089-B	10/31/2003	Field Sample		Surface soil	Park	Grid 22	Composite	5	12	14	PLM-9002	A	ND	ND
1R-24090-B	10/31/2003	Field Sample		Surface soil	Park	Grid 21	Composite	5	18	20	PLM-9002	A	ND	ND
1R-24091-B	11/5/2003	Field Sample		Surface soil	Park	Grid 37	Composite	5	36	38	PLM-9002	B2	< 1	ND
1R-24092-B	11/5/2003	Field Sample		Surface soil	Park	Grids 38/42	Composite	5	36	38	PLM-9002	B2	< 1	ND

Table 2-23. Area 2 Removal-related Soil Sample Results – October/November 2003

Sample ID	Sample Date	Category	Parent ID	Matrix	Sample Group	Location Description (Sub Location)	Sample Type	Number of Subsamples	Top Depth (inches)*	Bottom Depth (inches)*	Analytical Results			
											Method	LA Bin	LA (%)	C (%)
1R-24093-B	11/7/2003	Field Sample		Surface soil	Park	Grids 41/44	Composite	5	36	38	PLM-9002	A	ND	ND
1R-24094-B	11/7/2003	Field Sample		Surface soil	Park	Grids 46/47/48	Composite	5	24	26	PLM-9002	A	ND	ND
1R-24096-B	11/11/2003	Field Sample		Surface soil	Park	Grid 39	Composite	5	36	38	PLM-9002	C	2	ND
1R-24097-B	11/11/2003	Field Sample		Surface soil	Park	Grids 43/45	Composite	5	36	38	PLM-9002	B2	< 1	ND
1R-24098-B	11/11/2003	Field Sample		Surface soil	Park	Grid 40	Composite	5	12	14	PLM-9002	A	ND	ND
1R-24099-B	11/13/2003	Field Sample		Surface soil	Park	to proximity to 1R-24096; no visible	Composite	5	36	38	PLM-9002	B2	< 1	ND
1R-24100-B	11/13/2003	Field Sample		Surface soil	Park	sample results; no visible vermiculite	Composite	5	36	38	PLM-9002	B2	< 1	ND

Notes and Definitions:

The report excludes all Lab QC results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.

*Sample depths were recorded in relation to the surface of the excavation rather than in relation to ground surface. Actual excavation and sample depths ranged from 6 to 36 inches below ground surface (refer to Figure 1-6).

B suffix in Sample ID = non-processed sample

LA = Libby Amphibole

C = Chrysotile

ND = non-detect

% = percent

PLM = polarized light microscopy

PLM-9002 = National Institute for Occupational Safety and Health 9002 method

< = less than

Table 2-24. Area 2 Removal-related Personal Air Sample Results – October/November 2003

Sample ID	Task	Property Group (Location)	Sample Group	Location Description (Sub Location)	Media Type	Matrix	Sample Type	Category	Volume (L)	Sample Date	PCM (NIOSH 7400) f/cc	
1R-23468	Truck driver-level D	Riverside Park	Vehicle	Shoulder	Air	Outdoor	Personal	Field Sample	484	10/9/2003		0.04
1R-23469	Truck driver-level D	Riverside Park	Vehicle	Shoulder	Air	Outdoor	Personal	Field Sample	64	10/9/2003	<	0.042
1R-23685	Laborer	Riverside Park	Property	Shoulder	Air	Outdoor	Personal	Field Sample	218	10/20/2003		0.015
1R-23686	Level D Truck Driver	Riverside Park	Property	Shoulder	Air	Outdoor	Personal	Field Sample	204	10/20/2003		0.041
1R-23688	Level D Truck Driver	Riverside Park	Property	Shoulder	Air	Outdoor	Personal	Field Sample	62	10/20/2003		0.12
1R-23689	Level D Truck Driver	Riverside Park	Property	Shoulder	Air	Outdoor	Personal	Field Sample	171	10/20/2003		0.067
1R-23690	Laborer	Riverside Park	Property	Shoulder	Air	Outdoor	Personal	Field Sample	202	10/20/2003	<	0.013
1R-23691	Level D Truck Driver	Riverside Park	Property	Shoulder	Air	Outdoor	Personal	Field Sample	66	10/20/2003	<	0.041

Notes and Definitions:

The report excludes all lab quality control results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.

LA = Libby Amphibole

C = Chrysotile

OA = Other Amphibole

NIOSH 7400 = National Institute for Occupational Safety and Health method 7400

PCM = phase contrast microscopy

f/cc = fibers per cubic centimeter

NIOSH 7400 = National Institute for Occupational Safety and Health method 7400

L = liters

S/cm² = Structures per square centimeter

< = less than

Table 2-25. Area 2 Investigation Surface Soil Sample Results – September 2007

Sample ID	Sample Date	Category	Parent ID	Matrix	Sample Group	Location Description (Sub Location)	Sample Type	Number of Subsamples	Top Depth (inches)	Bottom Depth (inches)	Analytical Results			
											PLM-VE			
											LA Bin	LA (%)	C (%)	
EP-00002	9/12/2007	Field Sample		Surface soil	Property	Riverside park SE of boat ramp	Composite	30	0	3	A	ND		ND
EP-00009	9/13/2007	Field Sample		Surface soil	Property	Park	Composite	30	0	3	A	ND		ND
EP-00018	9/14/2007	Field Sample		Surface soil	Property	Riverside park, parking lot	Composite	30	0	3	A	ND		ND
EP-00019	9/17/2007	Field Sample		Surface soil	Property	Park	Composite	30	0	6	A	ND		ND
EP-00020	9/17/2007	Field Sample		Surface soil	Property	Park	Composite	30			A	ND		ND
EP-00021	9/17/2007	Field Sample		Surface soil	Property	Driveway	Composite	30	0	4	A	ND		ND
EP-00022	9/17/2007	Field Sample		Surface soil	Property	Park	Composite	30	0	6	A	ND		ND
EP-00023	9/17/2007	Field Sample		Surface soil	Property	Driveway	Composite	30	0	3	A	ND		ND
EP-00024	9/17/2007	Field Sample		Surface soil	Property	Park	Composite	30			A	ND		ND

Notes and Definitions:

The report excludes all lab quality control results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.

LA = Libby Amphibole

C = Chrysotile

ND = non-detect

TR = trace

PLM-VE = visual estimation method

PLM-Grav = gravimetric method

% = percent

< = less than

Table 2-26. Area 3 Embankment Surface Soil Sample Results – September 2007

Sample ID	Sample Date	Category	Parent ID	Matrix	Sample Group	Location Description (Sub Location)	Sample Type	Number of Subsamples	Top Depth (inches)	Bottom Depth (inches)	Analytical Results		
											PLM-VE		
											LA Bin	LA (%)	C (%)
EP-00003	9/12/2007	Field Sample		Surface soil	Property	Embankment (S.E.)	Composite	30	0	3	A	ND	ND
EP-00010	9/13/2007	Field Sample		Surface soil	Property	Embankment (S.W.)	Composite	30	0	3	A	ND	ND
EP-00011	9/13/2007	Field Sample		Surface soil	Property	Embankment (N.W.)	Composite	30	0	3	A	ND	ND
EP-00016	9/14/2007	Field Sample		Surface soil	Property	Embankment (N.E.)	Composite	30	0	3	A	ND	ND
EP-00036	9/19/2007	Field Sample		Surface soil	Property	N.W. Embankment; Grid 1	Composite	30	0	6	A	ND	ND
EP-00037	9/19/2007	Field Sample		Surface soil	Property	N.W. Embankment; Grid 2	Composite	30	0	6	A	ND	ND
EP-00038	9/19/2007	Field Sample		Surface soil	Property	S.E. Embankment; Grid 2	Composite	30	0	6	A	ND	ND
EP-00039	9/19/2007	Field Sample		Surface soil	Property	S.E. Embankment; Grid 3	Composite	30	0	6	A	ND	ND
EP-00041	9/18/2007	Field Sample		Surface soil	Property	Embankment (S.W.)	Composite	30	0	6	A	ND	ND
EP-00042	9/18/2007	Field Sample		Surface soil	Property	Embankment (S.W.)	Composite	30	0	6	A	ND	ND
EP-00043	9/18/2007	Field Sample		Surface soil	Property	Embankment (S.W.)	Composite	30	0	6	A	ND	ND
EP-00044	9/18/2007	Field Sample		Surface soil	Property	Embankment (S.W.)	Composite	30	0	6	A	ND	ND
EP-00045	9/18/2007	Field Sample		Surface soil	Property	Embankment (S.W.)	Composite	30	0	6	A	ND	ND
EP-00046	9/18/2007	Field Sample		Surface soil	Property	Embankment	Composite	30	0	6	A	ND	ND
EP-00047	9/18/2007	Field Sample		Surface soil	Property	Embankment (S.W.)	Composite	30	0	6	B1	TR	ND
EP-00048	9/18/2007	Field Sample		Surface soil	Property	Embankment (S.W.)	Composite	30	0	6	B1	TR	ND
EP-00053	9/19/2007	Field Sample		Surface soil	Property	S.E. Embankment; Grid 1	Composite	30	0	6	A	ND	ND
EP-00054	9/19/2007	Field Sample		Surface soil	Property	S.E. Embankment; Grid 4	Composite	30	0	6	A	ND	ND
EP-00062	9/20/2007	Field Sample		Surface soil	Property	N.E. embankment	Composite	30	0	6	B2	< 1	ND
EP-00063	9/20/2007	Field Sample		Surface soil	Property	N.E. embankment	Composite	30	0	6	A	ND	ND
EP-00064	9/20/2007	Field Sample		Surface soil	Property	N.E. embankment	Composite	30	0	6	A	ND	ND
EP-00065	9/20/2007	Field Sample		Surface soil	Property	S.E. embankment	Composite	30	0	6	A	ND	ND

Notes and Definitions:

The report excludes all lab quality control results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.

LA = Libby Amphibole

C = Chrysotile

ND = non-detect

TR = trace

PLM-VE = visual estimation method

PLM-Grav = gravimetric method

% = percent

< = less than

Table 2-27. Area 3 Embankment Subsurface Soil Sample Results – September 2007

Sample ID	Sample Date	Category	Parent ID	Matrix	Sample Group	Location Description (Sub Location)	Sample Type	Number of Subsamples	Top Depth (inches)	Bottom Depth (inches)	Analytical Results		
											PLM-VE		
											LA Bin	LA (%)	C (%)
EP-00069	9/21/2007	Field Sample		Surface soil	Property	Embankment (SW)	Grab		0	24	A	ND	ND
EP-00070	9/21/2007	Field Sample		Surface soil	Property	Embankment (SW)	Grab		0	24	A	ND	ND
EP-00071	9/21/2007	Field Sample		Surface soil	Property	Embankment (SW)	Grab		0	24	A	ND	ND
EP-00072	9/21/2007	Field Sample		Surface soil	Property	Embankment (SW)	Grab		0	24	A	ND	ND
EP-00073	9/21/2007	Field Sample		Surface soil	Property	Embankment (NW)	Grab		0	24	A	ND	ND
EP-00074	9/21/2007	Field Sample		Surface soil	Property	Embankment (NW)	Grab		0	24	A	ND	ND
EP-00075	9/21/2007	Field Sample		Surface soil	Property	Embankment (NW)	Grab		0	24	A	ND	ND
EP-00076	9/21/2007	Field Sample		Surface soil	Property	Embankment (NE)	Grab		0	24	A	ND	ND
EP-00077	9/21/2007	Field Sample		Surface soil	Property	Embankment (NE)	Grab		0	24	A	ND	ND
EP-00078	9/21/2007	Field Sample		Surface soil	Property	Embankment (NE)	Grab		0	24	B1	TR	ND
EP-00079	9/21/2007	Field Sample		Surface soil	Property	Embankment (SE)	Grab		0	24	A	ND	ND
EP-00080	9/21/2007	Field Sample		Surface soil	Property	Embankment (SE)	Grab		0	24	A	ND	ND
EP-00081	9/21/2007	Field Sample		Surface soil	Property	Embankment (NE)	Grab		0	24	A	ND	ND
EP-00082	9/21/2007	Field Sample		Surface soil	Property	Embankment (SW)	Grab		0	24	B1	TR	ND
EP-00083	9/21/2007	Field Sample		Surface soil	Property	Embankment (SW)	Grab		0	24	A	ND	ND

Notes and Definitions:

The report excludes all lab quality control results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.

LA = Libby Amphibole

C = Chrysotile

ND = non-detect

TR = trace

PLM-VE = visual estimation method

PLM-Grav = gravimetric method

% = percent

< = less than

Table 6-1 Exposure Parameters Based on Site-Survey

Receptor Group	Exposure Location	Activity Pattern	ET (hrs/day)		EF (days/yr)		TWF	
			CTE	RME	CTE	RME	CTE	RME
Search/Rescue Volunteers	Indoors	Active	0.6	1	72	300	0.0053	0.0341
		Passive	1	2	72	300	0.0096	0.0618
	Outdoors	Active	0.5	0.8	72	300	0.0045	0.0288
		Passive	0.2	0.4	72	300	0.0019	0.0123
Fishing Guides	Outdoors	Active	0.15	0.17	150	245	0.0026	0.0048
		Passive	0.15	0.17	150	245	0.0026	0.0048

Receptor Group	Age at Start		Exp. Dur. (yrs)		IUR	
	CTE	RME	CTE	RME	CTE	RME
Search/Rescue	40	20	30	50	0.0288	0.0871
Fishing Guides	25	20	40	50	0.0659	0.0871

Table 6-2 Exposure Parameters Based on Professional Judgement

Receptor Group	Exposure Location	Activity Pattern	ET (hrs/day)		EF (days/yr)		TWF	
			CTE	RME	CTE	RME	CTE	RME
Recreational Visitors	Outdoors	Active	0.5	1	25	50	0.0014	0.0057
		Passive	2	4	25	50	0.0057	0.0228
City Workers	Outdoors	Active	2	4	219	250	0.0500	0.1142
		Passive	1	1	219	250	0.0250	0.0285
Future Commercial Workers	Outdoors	Active	4	7	219	250	0.1000	0.1998
		Passive	4	1	219	250	0.1000	0.0285
Future Construction Workers	Outdoors	Active	7	7	100	200	0.0799	0.1598
		Passive	1	1	100	200	0.0114	0.0228

Receptor Group	Age at Start		Exp. Dur. (yrs)		IUR	
	CTE	RME	CTE	RME	CTE	RME
Recreational Visitors	0	0	9	30	0.0779	0.1726
City Workers	20	20	10	25	0.0388	0.0690
Commercial Workers	20	20	10	25	0.0388	0.0690
Construction Workers	20	20	1	5	0.0049	0.0220

Acronyms:

ET = Exposure time

EF = Exposure frequency

TWF = Time-weighting factor

CTE = Central tendency exposure

RME = Reasonable maximum exposure

IUR = Inhalation unit risk

Table 6-3
Outdoor Ambient Air Data

Location	LA Concentration (PCME s/cc)	
	Mean	Maximum
OU4-North	7.00E-06	1.13E-04
OU4-East	9.22E-06	1.49E-04
OU4-Central	3.75E-06	5.40E-04
OU4-South	2.54E-06	7.98E-05
OU2	2.27E-06	3.99E-05
OU6	8.59E-06	2.25E-04

Source: USEPA (2009)

Acronyms:

LA = Libby amphibole

OU = Operable Unit

PCME = Phase contrast microscopy equivalent

s/cc = structures per cubic centimeter

Table 6-4
Evaluation of Cancer Risks from Passive Exposure to Outdoor Ambient Air

Panel A: Best Estimate

Receptor Group	EPC(mean) PCME s/cc	TWF		IUR		Risk	
		CTE	RME	CTE	RME	CTE	RME
Search/Rescue	7.0E-06	0.0019	0.0123	0.0288	0.0871	4E-10	8E-09
Fishing Guides	7.0E-06	0.0026	0.0048	0.0659	0.0871	1E-09	3E-09
Recreational Visitor	7.0E-06	0.0057	0.0228	0.0779	0.1726	3E-09	3E-08
City Worker	7.0E-06	0.0250	0.0285	0.0388	0.0690	7E-09	1E-08
Commercial Worker	7.0E-06	0.1000	0.0285	0.0388	0.0690	3E-08	1E-08
Construction Worker	7.0E-06	0.0114	0.0228	0.0049	0.0220	4E-10	4E-09

Panel B: Upper Bound

Receptor Group	EPC(max.) PCME s/cc	TWF		IUR		Risk	
		CTE	RME	CTE	RME	CTE	RME
Search/Rescue	1.1E-04	0.0019	0.0123	0.02885	0.08714	6E-09	1E-07
Fishing Guides	1.1E-04	0.0026	0.0048	0.06586	0.08714	2E-08	5E-08
Recreational Visitor	1.1E-04	0.0057	0.0228	0.07794	0.17261	5E-08	4E-07
City Worker	1.1E-04	0.0250	0.0285	0.03880	0.06905	1E-07	2E-07
Commercial Worker	1.1E-04	0.1000	0.0285	0.03880	0.06905	4E-07	2E-07
Construction Worker	1.1E-04	0.0114	0.0228	0.00488	0.02198	6E-09	6E-08

Acronyms:

TWF = Time weighting factor

IUR = Inhalation unit risk

CTE = Central tendency exposure

RME = Reasonable maximum exposure

EPC = Exposure point concentration

PCME = Phase contrast microscopy equivalent

s/cc = Structures per cubic centimeter

Table 6-5
Indoor Personal Air Data at the Search and Rescue Facility

Location	Activity Level	Sensitivity (cc)-1	Total LA Count	Total LA Conc. (s/cc)	PCME LA Conc. (s/cc)
Garage	Active	7.1E-03	3	2.1E-02	7.1E-03
Garage	Active	2.7E-03	1	2.7E-03	0.0E+00
Garage	Active	8.5E-03	5	4.2E-02	2.5E-02
Garage	Active	2.4E-02	0	0.0E+00	0.0E+00
Garage	Active	1.2E-02	1	1.2E-02	0.0E+00
Garage	Active	4.9E-03	5	2.5E-02	0.0E+00
Garage	Active	1.8E-02	0	0.0E+00	0.0E+00
Garage	Active	7.0E-03	10	7.0E-02	2.8E-02
Garage	Active	4.6E-03	1	4.6E-03	0.0E+00
Garage	Active	4.2E-03	2	8.3E-03	0.0E+00
Garage	Active	7.7E-03	0	0.0E+00	0.0E+00
Garage	Active	5.1E-03	4	2.1E-02	0.0E+00
Garage	Active	1.9E-02	1	1.9E-02	1.9E-02
Garage	Active	1.4E-02	2	2.8E-02	0.0E+00
Garage	Active	1.9E-02	1	1.9E-02	0.0E+00
Garage	Active	1.7E-02	0	0.0E+00	0.0E+00
Meeting room	Active	2.7E-04	4	1.1E-03	8.0E-04
Meeting room	Active	9.8E-04	9	8.8E-03	3.9E-03
Meeting room	Active	2.9E-04	8	2.3E-03	8.8E-04
Meeting room	Passive	3.0E-04	1	3.0E-04	0.0E+00
Meeting room	Passive	2.6E-04	3	7.9E-04	5.3E-04
Meeting room	Passive	2.8E-04	1	2.8E-04	2.8E-04

Results are based on a download of the Libby2 database performed on 4-14-09.

Summary Statistics

Activity Level	PCME s/cc	
	Mean	Max
Active	4.5E-03	2.8E-02
Passive	2.7E-04	5.3E-04

Acronyms:

cc = cubic centimeters

LA = Libby amphibole

PCME = Phase contrast microscopy equivalent

s/cc = Structures per cubic centimeter

Table 6-6
Evaluation of Cancer Risks from Exposure to Indoor Air

Panel A: Best Estimate

Receptor Group	Activity Level	EPC(mean) PCME s/cc	TWF		IUR		Risk	
			CTE	RME	CTE	RME	CTE	RME
Search and Rescue	Active	4.5E-03	0.00533	0.0341	0.0288	0.0871	7E-07	1E-05
	Passive	2.7E-04	0.00963	0.0618	0.0288	0.0871	7E-08	1E-06
	Total						8E-07	1E-05

Panel B: Upper Bound

Receptor Group	Activity Level	EPC(max.) PCME s/cc	TWF		IUR		Risk	
			CTE	RME	CTE	RME	CTE	RME
Search and Rescue	Active	2.8E-02	0.0053	0.0341	0.0288	0.0871	4E-06	8E-05
	Passive	5.3E-04	0.0096	0.0618	0.0288	0.0871	1E-07	3E-06
	Total						4E-06	9E-05

Acronyms:

TWF = Time weighting factor

IUR = Inhalation unit risk

CTE = Central tendency exposure

RME = Reasonable maximum exposure

EPC = Exposure point concentration

PCME = Phase contrast microscopy equivalent

s/cc = Structures per cubic centimeter

Table 6-7
Outdoor Air Data from Soil Disturbances

Activity	Sensitivity (cc)-1	Total LA Count	Total LA Conc. (s/cc)	PCME LA Conc. (s/cc)
Mowing / Brush-hogging	1.9E-03	2	3.8E-03	3.8E-03
Mowing / Brush-hogging	4.6E-03	1	4.6E-03	4.6E-03
Mowing / Brush-hogging	1.5E-03	0	0.0E+00	0.0E+00
Mowing / Brush-hogging	4.3E-03	1	4.3E-03	0.0E+00
Mowing / Brush-hogging	2.0E-03	35	7.2E-02	5.7E-02
Mowing / Brush-hogging	4.6E-03	1	4.6E-03	0.0E+00
Mowing / Brush-hogging	1.1E-03	8	8.9E-03	5.6E-03
Mowing / Brush-hogging	3.1E-03	0	0.0E+00	0.0E+00

Results are based on a download of the Libby2 database performed on 4-14-09.

Summary Statistics

Activity	N	PCME Conc. (s/cc)	
		Mean	Maximum
Mowing / Brush-hogging	8	8.9E-03	5.7E-02

Note: Data were collected after application of water to suppress dust release.

Acronyms:

cc = cubic centimeters

LA = Libby amphibole

PCME = Phase contrast microscopy equivalent

s/cc = Structures per cubic centimeter

N = Number of samples

Table 6-8
Evaluation of Cancer Risks from Outdoor Activities that Disturb Soil

Panel A: Best Estimate

Receptor Group	EPC(mean) PCME s/cc	TWF		IUR		Risk	
		CTE	RME	CTE	RME	CTE	RME
Search/Rescue	8.9E-03	0.0045	0.0288	0.0288	0.0871	1E-06	2E-05
Fishing Guides	8.9E-03	0.0026	0.0048	0.0659	0.0871	2E-06	4E-06
Recreational Visitor	8.9E-03	0.0014	0.0057	0.0779	0.1726	1E-06	9E-06
City Worker	8.9E-03	0.0500	0.1142	0.0388	0.0690	2E-05	7E-05
Commercial Worker	8.9E-03	0.1000	0.1998	0.0388	0.0690	3E-05	1E-04
Construction Worker	8.9E-03	0.0799	0.1598	0.0049	0.0220	3E-06	3E-05

Panel B: Upper Bound

Receptor Group	EPC(max) PCME s/cc	TWF		IUR		Risk	
		CTE	RME	CTE	RME	CTE	RME
Search/Rescue	5.7E-02	0.0045	0.0288	0.0288	0.0871	7E-06	1E-04
Fishing Guides	5.7E-02	0.0026	0.0048	0.0659	0.0871	1E-05	2E-05
Recreational Visitor	5.7E-02	0.0014	0.0057	0.0779	0.1726	6E-06	6E-05
City Worker	5.7E-02	0.0500	0.1142	0.0388	0.0690	1E-04	5E-04
Commercial Worker	5.7E-02	0.1000	0.1998	0.0388	0.0690	2E-04	8E-04
Construction Worker	5.7E-02	0.0799	0.1598	0.0049	0.0220	2E-05	2E-04

Acronyms:

TWF = Time weighting factor

IUR = Inhalation unit risk

CTE = Central tendency exposure

RME = Reasonable maximum exposure

EPC = Exposure point concentration

PCME = Phase contrast microscopy equivalent

s/cc = Structures per cubic centimeter

Table 7-1. Preliminary List of Chemical and Location Specific Federal and State Applicable or Relevant and Appropriate Requirements (ARARs)

Statute and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location
Federal ARARs					
National Historic Preservation Act (NHPA), 16 U.S.C. ' 470 40 CFR 6.301(b) 36 CFR 60, 63, 800	Applicable	This statute and implementing regulations require federal agencies to take into account the effect of this response action upon any district, site, building, structure, or object that is included in or eligible for the National Register of Historic Places.	If cultural resources on or eligible for the national register are present, it will be necessary to determine if there will be an adverse effect and if so how the effect may be minimized or mitigated. The unauthorized removal of archaeological resources from public or Indian lands is prohibited without a permit, and any archaeological investigations at a site must be conducted by a professional archaeologist.		✓
Archaeological and Historic Preservation Act 16 U.S.C. ' 469 40 CFR 6.301(c) 43 CFR 7	Applicable	This statute and implementing regulations establish requirements for the evaluation and preservation of historical and archaeological data, which may be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity or program.	If any remedial action activities are necessary beyond permitted, SHPO consultation and NHPA compliance will be addressed during remedial design.		✓
Fish and Wildlife Coordination Act 16 U.S.C. ' ' 661, et seq., 40 CFR 6.302(g) 50 CFR 83 33 CFR 320-330	Applicable	This statute and implementing regulations require coordination with federal and state agencies for federally funded projects to ensure that any modification of any stream or other water body affected by any action authorized or funded by the federal agency provides for adequate protection of fish and wildlife resources.	If the remedial action involves activities that affect wildlife and/or non-game fish, federal agencies must first consult with the U.S. Fish and Wildlife Service and the relevant state agency with jurisdiction over wildlife resources.		✓
Endangered Species Act, 16 U.S.C. ' 1531 40 CFR 6.302(h) 50 CFR 17 and 402	Relevant and Appropriate	This statute and implementing regulations provide that federal activities not jeopardize the continued existence of any threatened or endangered species. Endangered Species Act, Section 7 requires consultation with the U.S. Fish and Wildlife Service to identify the possible presence of protected species and mitigate potential impacts on such species.	If threatened or endangered species are identified within the remedial areas, activities must be designed to conserve the species and their habitat. To date no threatened or endangered species have been identified in the area of the site.		✓

Statute and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location
Federal ARARs					
Migratory Bird Treaty Act, 16 U.S.C. ' ' 703, et seq. 50 CFR 10.13	Relevant and Appropriate	This requirement establishes a federal responsibility for the protection of the international migratory bird resource and requires continued consultation with the U.S. Fish and Wildlife Service during remedial design and remedial construction to ensure that the cleanup of the site does not unnecessarily impact migratory birds.	The selected remedial actions will be carried out in a manner to avoid adversely affecting migratory bird species, bald eagle and including individual birds or their nests.		✓
Clean Air Act (CAA) 42 U.S.C. ' 7401, et seq. 40 CFR 61, Subpart M (delegated to the state and incorporated by reference at ARM 17.8.341)	Applicable	National Emission Standards for Hazardous Air Pollutants (NESHAPs) for Asbestos	The selected remedial actions will be carried out in a manner that will comply with all the National Emission Standard for Asbestos as required under NESHAP.	✓	
Clean Air Act (CAA) Air Cleaning 40 CFR 61.152 Note: Section 61.152(b)(3) is not delegated to the State	Relevant and Appropriate	This requirement establishes detailed specifications for air cleaning used as part of a system to control asbestos emissions control system.	These requirements would be applicable if air cleaning is part of the building demolitions. It would be relevant and appropriate to other air cleaning operations.	✓	
Clean Air Act (CAA) Air Cleaning 40 CFR 61.155	Relevant and Appropriate	This requirement establishes detailed standards for operations that convert asbestos containing waste material into non-asbestos (asbestos-free) material.	These requirements would be applicable if the remedial action includes any treatment of asbestos containing material.	✓	

Statute and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location
State of Montana ARARs					
Montana Asbestos Control Act ARM 17.8.204 ARM 17.8.206	Relevant and Appropriate	Ambient Air Monitoring & Ambient Air Methods and Data: Require that all ambient air monitoring, sampling and data collection, recording, analysis and transmittal shall be in compliance with the Montana Quality Assurance Manual except when more stringent requirements are determined to be necessary.	These requirements will be followed unless an equivalent or more stringent approach is deemed appropriate.	✓	
Montana Asbestos Control Act ARM 17.8.220 ARM 17.8.223	Applicable	Ambient air quality standard for settled particulate matter. Particulate matter concentrations in the ambient air shall not exceed the following 30-day average: 10 grams per square meter. Ambient air quality standards for PM-10. PM-10 concentrations in the ambient air shall not exceed the following standards: 150 micrograms/cubic meter of air, 24-hour average; and 50 micrograms/cubic meter of air, expected annual average.	The removal action will involve significant soil disturbance. Particulate/dust levels will need to be controlled. Each of the ambient air quality standards includes specific requirements and methodologies for monitoring and detection. These requirements will be followed unless an equivalent or more stringent approach is deemed appropriate.	✓	
Montana Asbestos Control Act ARM 17.8.304	Applicable	Visible Air Contaminants. No source may discharge emissions into the atmosphere that exhibit opacity of 20 percent or greater, averaged over six consecutive minutes. This standard is limited to point sources, but excludes wood waste burners, incinerators, and motor vehicles.	No visible emissions are anticipated.	✓	
Montana Asbestos Control Act ARM 17.8.308	Applicable	Airborne Particulate Matter. Emissions of airborne particulate matter from any stationary source shall not exhibit opacity of 20 percent or greater, averaged over six consecutive minutes.	This standard applies to the production, handling, transportation, or storage of any material; to the use of streets, roads, or parking lots; and to construction or demolition projects.	✓	
Montana Asbestos Control Act ARM 17.8.315	Relevant and Appropriate	Odors. If a business or other activity will create odors, those odors must be controlled, and no business or activity may cause a public nuisance.	Action is not expected to produce nuisance level odors.	✓	

Statute and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location
State of Montana ARARs					
Montana Water Quality Control Act ARM 17.30.637	Applicable	It states that no waste may be discharged and no activities conducted which, either alone or in combination with other waste activities, will cause violation of surface water quality standards; provided a short term exemption from a surface water quality standard may be authorized by the department for emergency remediation activities under the conditions specified in § 75-5-308, MCA.		✓	
Montana Water Quality Control Act ARM 17.30.705	Applicable	Requires that for any surface water, existing and anticipated uses and the water quality necessary to protect these uses must be maintained and protected unless degradation is allowed under the nondegradation rules at ARM 17.30.708.		✓	
Montana Asbestos Control Act ARM 17.74.351 ARM 17.74.365	Applicable	Adopts and incorporates by reference 40 CFR subparts A and M (NESHAP) for asbestos, and the National Institute of Occupational Safety and Health (NIOSH) Manual of Analytical Methods for detecting asbestos by phase contrast microscopy (PCM) and a description of the 7402 Analytical Method for detecting asbestos by transmission electron microscopy (TEM). It requires that training for asbestos workers, supervisors, inspectors, project management planners, and project designers meet requirements of 40 CFR 763, subpart E, Appendix C (Asbestos Model Accreditation Plan).		✓	

Statute and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location
State of Montana ARARs					
The Montana Asbestos Control Manual	Applicable	The Montana Asbestos Control Manual (the Manual) is adopted and incorporated by reference in ARM Title 17, Chapter 74, Subchapter 3. The Manual identifies practices and procedures for inspecting for asbestos, conducting asbestos projects, and clearing asbestos projects. The Montana Department of Environmental Quality administers NESHAP through its asbestos control program. The NESHAP contains standards that regulate building demolitions, renovations, asbestos disposal sites, and other sources of asbestos emissions.		✓	
Montana Code Annotated (MCA), Montana Floodplain and Floodway Management Act and Regulations , ARM 36.15.601 et seq. MCA 76-5-401 et seq.	Relevant and Appropriate	The Floodplain and Floodway Management Act and regulations specify types of uses and structures that are allowed or prohibited in the designated 100-year floodway and floodplain. Libby OU2 is adjacent to the Kootenai River, and these standards are relevant to all actions within the floodplain.	The Screening Plant is presumed to be outside the 100 year flood plain. No solid waste disposal will occur within the floodway or floodplain.		✓
Montana Code Annotated (MCA), Montana Antiquities Act, MCA 22-3-421, et seq.	Relevant and Appropriate	Montana Antiquities Act addresses the responsibilities of State agencies regarding historic and prehistoric sites including buildings, structures, paleontological sites, archaeological sites on state owned lands. Each State agency is responsible for establishing rules regarding historic resources under their jurisdiction which address National Register eligibility, appropriate permitting procedures and other historic preservation goals. The State Historic Preservation Office maintains information related to the responsibilities of State Agencies under the Antiquities Act.			✓
Montana Code Annotated (MCA), Montana Human	Applicable	The Human Skeletal Remains and Burial Site Protection Act is the result of years of			✓

Statute and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location
State of Montana ARARs					
Skeletal Remains and Burial Site Protection Act (1991), MCA 22-3-801 et seq.		work by Montana Tribes, State agencies and organizations interested in ensuring that all graves within the State of Montana are adequately protected. If human skeletal remains or burial sites are encountered during remedial activities within OU2 of the Libby Asbestos Site, then these requirements will be applicable.			
Montana Code Annotated (MCA), Local Air Pollution Control Program MCA 75-3-301	Applicable	The provisions of the Lincoln County Air Pollution Control Program, approved by Montana DEQ pursuant to § 75-2-301, MCA and administered by Lincoln County, are designed to regulate activities within a designated Air Pollution Control District to achieve and maintain such levels of air quality as will protect human health and safety and, to the greatest degree practicable, prevent injury to plant and animal life and property, and facilitate the enjoyment of the natural attractions of Lincoln County.			✓
Montana Code Annotated (MCA) MCA 75-5-605	Applicable	Prohibits the causing of pollution of any state waters. Section 75-5-103(21)(a)(i) defines pollution as contamination or other alteration of physical, chemical, or biological properties of state waters which exceeds that permitted by the water quality standards. States that it is unlawful to place or cause to be placed any wastes where they will cause pollution of any state waters. Any permitted placement of waste is not placement if the agency's permitting authority contains provisions for review of the placement of materials to ensure it will not cause pollution to state waters.	These requirements would be triggered only in the event that the removal action impacts surface of groundwater. Excavation may take place close to the Kootenai River. Precautions will need to be put into place to prevent accidental release of asbestos containing soils into the river. May also be applicable if disposal of RACM occurs on-site.		✓

Statute and Regulatory Citation	ARAR Determination	Description	Comment	Chemical	Location
State of Montana ARARs					
Montana Code Annotated (MCA) MCA 87-5-502 and 504	Applicable	Provide that a state agency or subdivision shall not construct, modify, operate, maintain or fail to maintain any construction project or hydraulic project which may or will obstruct, damage, diminish, destroy, change, modify, or vary the natural existing shape and form of any stream or its banks or tributaries in a manner that will adversely affect any fish or game habitat. The requirement that any such project must eliminate or diminish any adverse effect on fish or game habitat is applicable to the state in approving remedial actions to be conducted. The Natural Streambed and Land Preservation Act of 1975, MCA ' 75-7-101, et seq., (Applicable -- substantive provisions only) includes similar requirements and is applicable to private parties as well as government agencies.	Consultation with the Montana Department of Fish, Wildlife and Parks, and any conservation district or board of county commissioners (or consolidated city/county government) is encouraged during the designing and implementing of the remedial action for OU2 of the Libby Asbestos Site.		✓

Appendix A
Asbestos Sampling Results for Fill Material
Used at Operable Unit 1

Appendix A - Asbestos Sampling Results for Fill Material Used at Operable Unit 1												
Note: The report excludes all Lab QC results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.												
Sample ID	Property Group (Location)	Sample Group	Location Description (Sub Location)	Media Type	Matrix	Sample Type	Sample Date	PLM				
								Method	LA Bin		LA (%)	C (%)
1R-02683	Plum Creek Pit	Property	Plum Creek Pit	Soil-Like	Fill	Field Sample	10/10/2000	PLM-9002	A	ND		ND
1R-14476	Plum Creek Pit	Borrow Source	Borrow source	Soil-Like	Fill	Field Sample	9/4/2002	PLM-9002	A	ND		ND
1R-14477	Plum Creek Pit	Borrow Source	Borrow source	Soil-Like	Fill	Field Sample	9/4/2002	PLM-9002	A	ND		ND
1R-14478	Plum Creek Pit	Borrow Source	Borrow source	Soil-Like	Fill	Field Sample	9/4/2002	PLM-9002	A	ND		ND
1R-14479	Plum Creek Pit	Borrow Source	Borrow source	Soil-Like	Fill	Field Sample	9/4/2002	PLM-9002	A	ND		ND
1R-14480	Plum Creek Pit	Borrow Source	Borrow source	Soil-Like	Fill	Field Sample	9/4/2002	PLM-9002	A	ND		ND
1R-21981-B	Boothman Pit	Borrow Source	Boothman fill pit, 9000 to 12000 cu yds	Soil-Like	Fill	Field Sample	7/30/2003	PLM-9002	A	ND		ND
1R-21358-B	Boothman Pit	Borrow Source	Boothman Fill Pit; 12,000 to 15,000 cu yds	Soil-Like	Fill	Field Sample	7/30/2003	PLM-9002	A	ND		ND
1R-21359-B	Boothman Pit	Borrow Source	Boothman fill pit; 15,000 to 18,000 cu. yds	Soil-Like	Fill	Field Sample	7/30/2003	PLM-9002	A	ND		ND
1R-21360-B	Boothman Pit	Borrow Source	Boothman fill pit; 18,000 to 21,000 cu. yds	Soil-Like	Fill	Field Sample	7/30/2003	PLM-9002	A	ND		ND

Appendix B
Personal and Stationary Air Monitoring
Data Collected During OU1 Removal and
Response Activities as of April 27, 2007

Server-Database: \\204.47.48.36\Libby2

[illegible]

Sample ID	Task	Property Group (Location)	Sample Group	Location Description (Sub Location)	Media Type	Matrix	Sample Type	Category	Pre Post Clear	Vol (air=L/ Area (dust=cm²)	Sample Date	Grid Open ings	Filter Status Non Analyzed	ISO Concentrations (Air = structures/cc)Dust = structures/cm³ (METHOD - ISO 10312)																		Other Amphiboles (OA)							
														Libby Amphiboles (LA)						Chrysotile (C)						Other Amphiboles (OA)													
														Excluded Structures			Structures Detected			Total Conc. LA	Total Count LA	Excluded Structures			Structures Detected			Total Conc. C	Total Count C	Excluded Structures			Structures Detected			Total Conc. OA	Total Count OA		
														Aspect Ratio < 5:1	Length < 0.5 u	Dia-meter > 0.5u	Length 0.5 to 5 u	Length 5 to 10 u	Length > 10 u			Aspect Ratio < 5:1	Length < 0.5 u	Dia-meter > 0.5u	Length 0.5 to 5 u	Length 5 to 10 u	Length > 10 u			Aspect Ratio < 5:1	Length < 0.5 u	Dia-meter > 0.5u	Length 0.5 to 5 u	Length 5 to 10 u	Length > 10 u				
1R-11239	Operate - Excavator	303 W. Thomas St	Clean Room	Clean room in decon trailer	Air	Indoor	Stationary	Field Sample	N/A	1346	9/28/2001	10		0	0	0.0026	0.0026	0	0	0.0052	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1R-11240		303 W. Thomas St	NAFU	Outside in exhaust of NAFU	Air	Outdoor	Stationary	Field Sample	N/A	1360	9/28/2001	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
1R-11263		303 W. Thomas St	Auto	Cab of excavator	Air	Outdoor	Personal	Field Sample	N/A	713	9/28/2001	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1R-11266		303 W. Thomas St	EXP-1	EXP-1	Air	Outdoor	Stationary	Field Sample	N/A	1485	9/29/2001	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1R-11267		303 W. Thomas St	EXP-2	EXP-2	Air	Outdoor	Stationary	Field Sample	N/A	1522	9/29/2001	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1R-11268		303 W. Thomas St	WRGrace	EXP-3	Air	Outdoor	Stationary	Field Sample	N/A	1487	9/29/2001	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1R-11269		303 W. Thomas St	EXP-4	EXP-4	Air	Outdoor	Stationary	Field Sample	N/A	1490	9/29/2001	10		0	0	0	0.0094	0	0.0094	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1R-11270		303 W. Thomas St	EXP-5	EXP-5	Air	Outdoor	Stationary	Field Sample	N/A	1461	9/29/2001	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1R-11271	Drive - Truck	303 W. Thomas St	EXP-6	EXP-6	Air	Outdoor	Stationary	Field Sample	N/A	1463	9/29/2001	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1R-11272		303 W. Thomas St	EXP-7	EXP-7	Air	Outdoor	Stationary	Field Sample	N/A	1534	9/29/2001	10		0	0	0	0.0023	0	0.0023	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1R-11273		303 W. Thomas St	Clean Room	Clean room	Air	Indoor	Stationary	Field Sample	N/A	1213	9/29/2001	10		0	0	0.0029	0.0115	0	0.0144	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1R-11274		303 W. Thomas St	NAFU	NAFU	Air	Outdoor	Stationary	Field Sample	N/A	1202	9/29/2001	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1R-11275		303 W. Thomas St	Planner Building	North side of Planner Bldg.	Air	Outdoor	Stationary	Field Sample	N/A	1267	9/29/2001	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1R-11276		303 W. Thomas St	Planner Building	South side of Planner Bldg.	Air	Outdoor	Stationary	Field Sample	N/A	1269	9/29/2001	10		0	0	0	0.0055	0	0.0055	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1R-11277		303 W. Thomas St	Auto	Cab of Truck	Air	Outdoor	Personal	Field Sample	N/A	858	9/29/2001	0								0	0															0	0		
1R-11277		303 W. Thomas St	Auto	Cab of Truck	Air	Outdoor	Personal	Field Sample	N/A	858	9/29/2001	10		0	0	0.0171	0.0512	0	0.0682	4	0	0	0	0	0.0171	0	0	0.0171	1	0	0	0	0	0	0	0	0	0	
1R-11469	Drive - Truck	303 W. Thomas St	EXP-1	EXP-1	Air	Outdoor	Stationary	Field Sample	N/A	1441	10/1/2001	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1R-11469		303 W. Thomas St	EXP-1	EXP-1	Air	Outdoor	Stationary	Field Sample	N/A	1441	10/1/2001	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1R-11470		303 W. Thomas St	EXP-2	EXP-2	Air	Outdoor	Stationary	Field Sample	N/A	1479	10/1/2001	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
1R-11471		303 W. Thomas St	WRGrace	EXP-3	Air	Outdoor	Stationary	Field Sample	N/A	1514	10/1/2001	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1R-11472		303 W. Thomas St	EXP-4	EXP-4	Air	Outdoor	Stationary	Field Sample	N/A	1479	10/1/2001	10		0.0024	0	0	0	0	0.0024	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1R-11473		303 W. Thomas St	EXP-5	EXP-5	Air	Outdoor	Stationary	Field Sample	N/A	1479	10/1/2001	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1R-11473		303 W. Thomas St	EXP-5	EXP-5	Air	Outdoor	Stationary	Field Sample	N/A	1479	10/1/2001	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1R-11474		303 W. Thomas St	EXP-6	EXP-6	Air	Outdoor	Stationary	Field Sample	N/A	1482	10/1/2001	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1R-11475	Drive - Truck	303 W. Thomas St	EXP-7	EXP-7	Air	Outdoor	Stationary	Field Sample	N/A	1485	10/1/2001	10		0	0	0	0.0024	0	0.0024	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1R-11476		303 W. Thomas St	EXP-8	EXP-8	Air	Outdoor	Stationary	Field Sample	N/A	1485	10/1/2001	10		0	0	0	0.0024	0	0.0024	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1R-11479		303 W. Thomas St	Property	Work area in E2	Air	Outdoor	Stationary	Field Sample	N/A	622	10/1/2001	10		0	0	0	0	0.0056	0	0.0056	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1R-11482		303 W. Thomas St	Clean Room	Clean room-export plant	Air	Indoor	Stationary	Field Sample	N/A	1359	10/1/2001	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1R-11486		303 W. Thomas St	EXP-1	EXP-1	Air	Outdoor	Stationary	Field Sample	N/A	1490	10/2/2001	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1R-11487		303 W. Thomas St	EXP-2	EXP-2	Air	Outdoor	Stationary	Field Sample	N/A	1463	10/2/2001	10		0	0	0	0.0024	0	0.0024	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1R-11488		303 W. Thomas St	WRGrace	EXP-3	Air	Outdoor	Stationary	Field Sample	N/A	1493	10/2/2001	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					

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1R-12723	Operato - Equipment	303 W. Thomas St	Property	Shoulder	Air	Outdoor	Personal	Field Sample	N/A	777	10/24/2001	0.006																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														

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														Filter Status Non Analyzed	Poisson Concentration Confidence Interval (90% Confidence Interval on Concentration)		Libby Amphiboles (LA)				Chrysotile (C)			Other Amphiboles (OA)				Total Asbestos			
															Lower Bound	Upper Bound	S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm²)	Asb conc (Air = S/cc) or (Dust = S/cm²)	S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm²)	Asb conc (Air = S/cc) or (Dust = S/cm²)	S<5u	S>5u	Asbestos Type Identified	S<5u	S>5u	Asb conc (Air = S/cc) or (Dust = S/cm²)	
1R-15901		303 W. Thomas St	Building	N.E. corner tool room	Air	Indoor	Stationary	Field Sample	Clear	1260	10/11/2002								0.00474	0.00474									0	0	<0.00474
1R-15902		303 W. Thomas St	Building	N.W. corner tool room	Air	Indoor	Stationary	Field Sample	Clear	1260	10/11/2002								0.00474	0.00474									0	0	<0.00474
1R-15903		303 W. Thomas St	Building	S.W. corner tool room	Air	Indoor	Stationary	Field Sample	Clear	1260	10/11/2002								0.00474	0.00474									0	0	<0.00474
1R-15904		303 W. Thomas St	Building	S.W. corner E. containment	Air	Indoor	Stationary	Field Sample	Clear	1260	10/12/2002								0.00474	0.00474									0	0	<0.00474
1R-15905		303 W. Thomas St	Building	S.E. corner E. containment	Air	Indoor	Stationary	Field Sample	Clear	1260	10/12/2002								0.00474	0.00474									0	0	<0.00474
1R-15906		303 W. Thomas St	Building	Center E. containment	Air	Indoor	Stationary	Field Sample	Clear	1260	10/12/2002								0.00474	0.00474									0	0	<0.00474
1R-15907		303 W. Thomas St	Building	Center W. wall E. containment	Air	Indoor	Stationary	Field Sample	Clear	1260	10/12/2002								0.00474	0.00474									0	0	<0.00474
1R-15908		303 W. Thomas St	Building	NE corner E. containment	Air	Indoor	Stationary	Field Sample	Clear	1260	10/12/2002								0.00474	0.00474									0	0	<0.00474
1R-14249		303 W. Thomas St	Property	North end	Air	Outdoor	Stationary	Field Sample - Grace	Pre	1249	10/22/2002	<0.002							0.00478	0.00478									0	0	<0.00478
1R-14250		303 W. Thomas St	Property	North west end	Air	Outdoor	Stationary	Field Sample - Grace	Pre	1222	10/22/2002	<0.002							0.00488	0.00488									0	0	<0.00488
1R-14251		303 W. Thomas St	Property	South west end	Air	Outdoor	Stationary	Field Sample - Grace	Pre	1241	10/22/2002	<0.002							0.00481	0.00481									0	0	<0.00481
1R-14252		303 W. Thomas St	Property	South end	Air	Outdoor	Stationary	Field Sample - Grace	Pre	1267	10/22/2002	<0.002							0.00471	0.00471									0	0	<0.00471
1R-14253		303 W. Thomas St	Property	South east end	Air	Outdoor	Stationary	Field Sample - Grace	N/A	1238	10/22/2002	<0.002							0.00482	0.00482									0	0	<0.00482
1R-14254		303 W. Thomas St	Property	North east end	Air	Outdoor	Stationary	Field Sample - Grace	Pre	1238	10/22/2002	<0.002							0.00482	0.00482									0	0	<0.00482
1R-16381		303 W. Thomas St	Property	North end	Air	Outdoor	Stationary	Field Sample - Grace	N/A	931	10/23/2002	0.004							0.00458	0.00458									0	0	<0.00458
1R-16382		303 W. Thomas St	Property	N.W. end	Air	Outdoor	Stationary	Field Sample - Grace	N/A	929	10/23/2002	<0.003							0.00459	0.00459									0	0	<0.00459
1R-16383		303 W. Thomas St	Property	Southwest end	Air	Outdoor	Stationary	Field Sample - Grace	N/A	924	10/23/2002	<0.003							0.00461	0.00461									0	0	<0.00461
1R-16384		303 W. Thomas St	Property	South end	Air	Outdoor	Stationary	Field Sample - Grace	N/A	916	10/23/2002	<0.003							0.00465	0.00465									0	0	<0.00465
1R-16385		303 W. Thomas St	Property	Southeast end	Air	Outdoor	Stationary	Field Sample - Grace	N/A	913	10/23/2002	0.003							0.00467	0.00467									0	0	<0.00467
1R-16386		303 W. Thomas St	Property	Northeast end	Air	Outdoor	Stationary	Field Sample - Grace	N/A	913	10/23/2002	0.003							0.00467	0.00467									0	0	<0.00467
1R-16389		303 W. Thomas St	Property	North end	Air	Outdoor	Stationary	Field Sample - Grace	N/A	1406	10/24/2002	<0.002							0.00425	0.00425									0	0	<0.00425
1R-16390		303 W. Thomas St	Property	North west end	Air	Outdoor	Stationary	Field Sample - Grace	N/A	1411	10/24/2002	<0.002							0.00423	0.00423									0	0	<0.00423
1R-16391		303 W. Thomas St	Property	South west end	Air	Outdoor	Stationary	Field Sample - Grace	N/A	1411	10/24/2002	0.002							0.00423	0.00423									0	0	<0.00423
1R-16392		303 W. Thomas St	Property	South end	Air	Outdoor	Stationary	Field Sample - Grace	N/A	1411	10/24/2002	<0.002							0.00423	0.00423									0	0	<0.00423
1R-16393		303 W. Thomas St	Property	South east end	Air	Outdoor	Stationary	Field Sample - Grace	N/A	1409	10/24/2002	<0.002							0.00424	0.00424									0	0	<0.00424
1R-16394		303 W. Thomas St	Property	North east end	Air	Outdoor	Stationary	Field Sample - Grace	N/A	1406	10/24/2002	<0.002							0.00425	0.00425									0	0	<0.00425
1R-16397		303 W. Thomas St	Property	North end	Air	Outdoor	Stationary	Field Sample - Grace	N/A	1236	10/25/2002	<0.002							0.00483	0.00483									0	0	<0.00483
1R-16398		303 W. Thomas St	Property	North west end	Air	Outdoor	Stationary	Field Sample - Grace	N/A	1233	10/25/2002	0.003							0.00484	0.00484									0	0	<0.00484
1R-16399		303 W. Thomas St	Property	South west end	Air	Outdoor	Stationary	Field Sample - Grace	N/A	1233	10/25/2002	<0.002							0.00484	0.00484									0	0	<0.00484
1R-16400		303 W. Thomas St	Property	South end	Air	Outdoor	Stationary	Field Sample - Grace	N/A	1233	10/25/2002	0.004							0.00484	0.00484									0	0	<0.00484
1R-16461		303 W. Thomas St	Property	South east end	Air	Outdoor	Stationary	Field Sample - Grace	N/A	1259	10/25/2002	<0.002							0.00474	0.00474									0	0	<0.00474
1R-16462		303 W. Thomas St	Property	North east end	Air	Outdoor	Stationary	Field Sample - Grace	N/A	1259	10/25/2002	<0.002							0.00474	0.00474									0	0	<0.00474
1R-16465		303 W. Thomas St	Property	North end	Air	Outdoor	Stationary	Field Sample - Grace	N/A	1272	10/26/2002	<0.002							0.00469	0.00469									0	0	<0.00469
1R-16466		303 W. Thomas St	Property	North west end	Air	Outdoor	Stationary	Field Sample - Grace	N/A	1277	10/26/2002																				

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1R-16964		303 W. Thomas St	Property	South end	Air	Outdoor	Stationary	Field Sample - Grace	N/A	1223	11/9/2002	< 0.002																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			

												PCM (METHOD - NIOSH 7400)		AHERA / ASTM 5755																	
Sample ID	Task	Property Group (Location)	Sample Group	Location Description (Sub Location)	Media Type	Matrix	Sample Type	Category	Pre Post Clear	Vol (air=LJ/ Area (dust=cm²)	Sample Date	Fibers/CC	Filter Status Analyzed	Poisson Concentration Confidence Interval (90% Confidence Interval on Concentration)		Libby Amphiboles (LA)				Chrysotile (C)				Other Amphiboles (OA)				Total Asbestos			
														Lower Bound	Upper Bound	S<5u	S=5u	Analytical Sensitivity (Air = S/cc or Dust = S/cm³)	Asb conc (Air = S/cc) or (Dust = S/cm³)	S<5u	S=5u	Analytical Sensitivity (Air = S/cc or Dust = S/cm³)	Asb conc (Air = S/cc or Dust = S/cm³)	S<5u	S=5u	Asbestos Type Identified	S<5u	S=5u	Asb conc (Air = S/cc or Dust = S/cm³)		
1R-38188		303 W. Thomas St	Property	NE	Air	Outdoor	Stationary	Field Sample	N/A	1324	8/31/2006			0.0000	0.0088	0	0	0.00456	< 0.00456	0	0	0.00456	< 0.00456	0	0	0.00456	< 0.00456		0	0	< 0.00456
1R-38189		303 W. Thomas St	Property	SE	Air	Outdoor	Stationary	Field Sample	N/A	1374	8/31/2006			0.0000	0.0083	0	0	0.00431	< 0.00431	0	0	0.00431	< 0.00431	0	0	0.00431	< 0.00431		0	0	< 0.00431
1R-38190		303 W. Thomas St	Property	SW	Air	Outdoor	Stationary	Field Sample	N/A	1377	8/31/2006			0.0000	0.0083	0	0	0.00430	< 0.00430	0	0	0.00430	< 0.00430	0	0	0.00430	< 0.00430		0	0	< 0.00430
1R-38303	Laborer	303 W. Thomas St	Property	Shoulder	Air	Outdoor	Personal	Field Sample	N/A	289	8/31/2006	< 0.009																			
1R-38304	Laborer	303 W. Thomas St	Property	Shoulder	Air	Outdoor	Personal	Field Sample	N/A	63	8/31/2006	< 0.043																			
1R-38305	Laborer	303 W. Thomas St	Property	Shoulder	Air	Outdoor	Personal	Field Sample	N/A	152	8/31/2006	< 0.019																			
1R-38306	Operator	303 W. Thomas St	Property	Shoulder	Air	Outdoor	Personal	Field Sample	N/A	266	8/31/2006	< 0.01																			
1R-38307	Operator	303 W. Thomas St	Property	Shoulder	Air	Outdoor	Personal	Field Sample	N/A	63	8/31/2006	< 0.043																			
1R-38308	Operator	303 W. Thomas St	Property	Shoulder	Air	Outdoor	Personal	Field Sample	N/A	152	8/31/2006	0.019																			
1R-38309	Laborer	303 W. Thomas St	Property	Shoulder	Air	Outdoor	Personal	Field Sample	N/A	262	8/31/2006	< 0.01																			
1R-38310	Laborer	303 W. Thomas St	Property	Shoulder	Air	Outdoor	Personal	Field Sample	N/A	65	8/31/2006	< 0.041																			
1R-38311	Laborer	303 W. Thomas St	Property	Shoulder	Air	Outdoor	Personal	Field Sample	N/A	149	8/31/2006	0.021																			
1R-38194		303 W. Thomas St	Property	NW	Air	Outdoor	Stationary	Field Sample	N/A	1414	9/5/2006			0.0000	0.0080	0	0	0.00419	< 0.00419	0	0	0.00419	< 0.00419	0	0	0.00419	< 0.00419		0	0	< 0.00419
1R-38195		303 W. Thomas St	Property	NE	Air	Outdoor	Stationary	Field Sample	N/A	1360	9/5/2006			0.0000	0.0084	0	0	0.00436	< 0.00436	0	0	0.00436	< 0.00436	0	0	0.00436	< 0.00436		0	0	< 0.00436
1R-38196		303 W. Thomas St	Property	SE	Air	Outdoor	Stationary	Field Sample	N/A	1362	9/5/2006			0.0000	0.0084	0	0	0.00435	< 0.00435	0	0	0.00435	< 0.00435	0	0	0.00435	< 0.00435		0	0	< 0.00435
1R-38197		303 W. Thomas St	Property	SW	Air	Outdoor	Stationary	Field Sample	N/A	1360	9/5/2006			0.0000	0.0084	0	0	0.00436	< 0.00436	0	0	0.00436	< 0.00436	0	0	0.00436	< 0.00436		0	0	< 0.00436
1R-38199		303 W. Thomas St	Property	Clean room	Air	Indoor	Stationary	Field Sample	N/A	1274	9/6/2006			0.0000	0.0089	0	0	0.00465	< 0.00465	0	0	0.00465	< 0.00465	0	0	0.00465	< 0.00465		0	0	< 0.00465
1R-38316		303 W. Thomas St	Property	NW	Air	Outdoor	Stationary	Field Sample	N/A	1413	9/6/2006			0.0000	0.0080	0	0	0.00419	< 0.00419	0	0	0.00419	< 0.00419	0	0	0.00419	< 0.00419		0	0	< 0.00419
1R-38317		303 W. Thomas St	Property	NE	Air	Outdoor	Stationary	Field Sample	N/A	1416	9/6/2006			0.0000	0.0080	0	0	0.00418	< 0.00418	0	0	0.00418	< 0.00418	0	0	0.00418	< 0.00418		0	0	< 0.00418
1R-38318		303 W. Thomas St	Property	SE	Air	Outdoor	Stationary	Field Sample	N/A	1456	9/6/2006			0.0000	0.0078	0	0	0.00407	< 0.00407	0	0	0.00407	< 0.00407	0	0	0.00407	< 0.00407		0	0	< 0.00407
1R-38319		303 W. Thomas St	Property	SW	Air	Outdoor	Stationary	Field Sample	N/A	1397	9/6/2006			0.0000	0.0081	0	0	0.00424	< 0.00424	0	0	0.00424	< 0.00424	0	0	0.00424	< 0.00424		0	0	< 0.00424
1R-23101		Riverside Park	Property	SW of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1218	10/1/2003			0.0000	0.0093	0	0	0.00486	< 0.00486	0	0.00	0.00486	< 0.00486	0	0.00	0.00486	< 0.00486		0	0	< 0.00486
1R-23103		Riverside Park	Building	Clean room	Air	Indoor	Stationary	Field Sample	N/A	1365	10/1/2003			0.0000	0.0083	0	0	0.00434	< 0.00434	0	0.00	0.00434	< 0.00434	0	0.00	0.00434	< 0.00434		0	0	< 0.00434
1R-23319		Riverside Park	Property	E of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1252	10/1/2003			0.0000	0.0091	0	0	0.00473	< 0.00473	0	0.00	0.00473	< 0.00473	0	0.00	0.00473	< 0.00473		0	0	< 0.00473
1R-23320		Riverside Park	Property	SE of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1248	10/1/2003			0.0000	0.0091	0	0	0.00475	< 0.00475	0	0.00	0.00475	< 0.00475	0	0.00	0.00475	< 0.00475		0	0	< 0.00475
1R-23105		Riverside Park	Property	E of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1640	10/2/2003			0.0000	0.0087	0	0	0.00451	< 0.00451	0	0.00	0.00451	< 0.00451	0	0.00	0.00451	< 0.00451		0	0	< 0.00451
1R-23106		Riverside Park	Property	SE of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1711	10/2/2003			0.0000	0.0083	0	0	0.00433	< 0.00433	0	0.00	0.00433	< 0.00433	0	0.00	0.00433	< 0.00433		0	0	< 0.00433
1R-23107		Riverside Park	Property	SW of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1607	10/2/2003			0.0000	0.0089	0	0	0.00461	< 0.00461	0	0.00	0.00461	< 0.00461	0	0.00	0.00461	< 0.00461		0	0	< 0.00461
1R-23108		Riverside Park	Property	W of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1616	10/2/2003			0.0000	0.0088	0	0	0.00458	< 0.00458	0	0.00	0.00458	< 0.00458	0	0.00	0.00458	< 0.00458		0	0	< 0.00458
1R-23118		Riverside Park	Yard	E of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1428	10/3/2003			0.0000	0.0080	0	0	0.00415	< 0.00415	0	0.00	0.00415	< 0.00415	0	0.00	0.00415	< 0.00415		0	0	< 0.00415
1R-23119		Riverside Park	Yard	SE of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1395	10/3/2003	</																			

Sample ID	Task	Property Group (Location)	Sample Group	Location Description (Sub Location)	Media Type	Matrix	Sample Type	Category	Pre Post Clear	Vol (air=L)/ Area (dust=cm²)	Sample Date	PCM (METHOD - NIOSH 7400)	AHERA / ASTM 5755																			
													Fibers/CC	Filter Status Non Analyzed	Poisson Concentration Confidence Interval (90% Confidence Interval on Concentration)		Libby Amphiboles (LA)				Chrysotile (C)				Other Amphiboles (OA)			Total Asbestos				
															Lower Bound	Upper Bound	S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm²)	Asb conc (Air = S/cc) or (Dust = S/cm²)	S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm²)	Asb conc (Air = S/cc) or (Dust = S/cm²)	S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm²)	Asb conc (Air = S/cc) or (Dust = S/cm²)	Asbestos Type Identified	S<5u	S>5u	Asb conc (Air = S/cc) or (Dust = S/cm²)
1R-23851		Riverside Park	Property	S.E. of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1317	10/28/2003				0.0000	0.0086	0	0	0.00450	< 0.0045	0	0	0.00	< 0.0045	0	0	0.00	< 0.0045		0	0	< 0.0045
1R-24101		Riverside Park	Property	W. of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1283	10/29/2003			Overloaded			0	0		< 0	0	0		< 0	0	0		< 0				
1R-24102		Riverside Park	Property	S.W. of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1046	10/29/2003				0.0000	0.0091	0	0	0.00472	< 0.0047	0	0	0.00	< 0.0047	0	0	0.00	< 0.0047		0	0	< 0.0047
1R-24103		Riverside Park	Property	W.S.W. of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1345	10/29/2003				0.0000	0.0085	0	0	0.00440	< 0.0044	0	0	0.00	< 0.0044	0	0	0.00	< 0.0044		0	0	< 0.0044
1R-24104		Riverside Park	Property	SE. of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1380	10/29/2003				0.0000	0.0082	0	0	0.00429	< 0.0043	0	0	0.00	< 0.0043	0	0	0.00	< 0.0043		0	0	< 0.0043
1R-24113		Riverside Park	Property	W of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1222	10/30/2003				0.0000	0.0093	0	0	0.00485	< 0.0049	0	0	0.00	< 0.0049	0	0	0.00	< 0.0049		0	0	< 0.0049
1R-24114		Riverside Park	Property	SW of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1069	10/30/2003				0.0000	0.0089	0	0	0.00462	< 0.0046	0	0	0.00	< 0.0046	0	0	0.00	< 0.0046		0	0	< 0.0046
1R-24115		Riverside Park	Property	WSW of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1249	10/30/2003				0.0000	0.0091	0	0	0.00474	< 0.0047	0	0	0.00	< 0.0047	0	0	0.00	< 0.0047		0	0	< 0.0047
1R-24116		Riverside Park	Property	SE of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1083	10/30/2003				0.0000	0.0088	0	0	0.00456	< 0.0046	0	0	0.00	< 0.0046	0	0	0.00	< 0.0046		0	0	< 0.0046
1R-24142		Riverside Park	Property	E of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1110	10/31/2003				0.0000	0.0085	0	0	0.00445	< 0.0045	0	0	0.00	< 0.0045	0	0	0.00	< 0.0045		0	0	< 0.0045
1R-24143		Riverside Park	Property	SE of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1440	10/31/2003				0.0000	0.0079	0	0	0.00411	< 0.0041	0	0	0.00	< 0.0041	0	0	0.00	< 0.0041		0	0	< 0.0041
1R-24144		Riverside Park	Property	SSE of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1239	10/31/2003				0.0000	0.0092	0	0	0.00478	< 0.0048	0	0	0.00	< 0.0048	0	0	0.00	< 0.0048		0	0	< 0.0048
1R-24145		Riverside Park	Property	SW of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1085	10/31/2003				0.0000	0.0087	0	0	0.00455	< 0.0046	0	0	0.00	< 0.0046	0	0	0.00	< 0.0046		0	0	< 0.0046
1R-24156		Riverside Park	Property	W. of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1170	11/3/2003				0.0000	0.0081	0	0	0.00422	< 0.0042	0	0	0.00	< 0.0042	0	0	0.00	< 0.0042		0	0	< 0.0042
1R-24157		Riverside Park	Property	S.W. of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1252	11/3/2003				0.0000	0.0091	0	0	0.00473	< 0.0047	0	0	0.00	< 0.0047	0	0	0.00	< 0.0047		0	0	< 0.0047
1R-24158		Riverside Park	Property	S.E. of EZ	Air	Outdoor	Stationary	Field Sample	N/A	793	11/3/2003				0.0000	0.0090	0	0	0.00467	< 0.0047	0	0	0.00	< 0.0047	0	0	0.00	< 0.0047		0	0	< 0.0047
1R-24159		Riverside Park	Property	E. of EZ	Air	Outdoor	Stationary	Field Sample	N/A	906	11/3/2003				0.0000	0.0090	0	0	0.00467	< 0.0047	0	0	0.00	< 0.0047	0	0	0.00	< 0.0047		0	0	< 0.0047
1R-24126		Riverside Park	Property	E of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1204	11/4/2003				0.0000	0.0094	0	0	0.00492	< 0.0049	0	0	0.00	< 0.0049	0	0	0.00	< 0.0049		0	0	< 0.0049
1R-24127		Riverside Park	Property	SE of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1214	11/4/2003				0.0000	0.0094	0	0	0.00488	< 0.0049	0	0	0.00	< 0.0049	0	0	0.00	< 0.0049		0	0	< 0.0049
1R-24128		Riverside Park	Property	SW of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1085	11/4/2003				0.0000	0.0087	0	0	0.00455	< 0.0046	0	0	0.00	< 0.0046	0	0	0.00	< 0.0046		0	0	< 0.0046
1R-24129		Riverside Park	Property	W of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1151	11/4/2003				0.0000	0.0082	0	0	0.00429	< 0.0043	0	0	0.00	< 0.0043	0	0	0.00	< 0.0043		0	0	< 0.0043
1R-24135		Riverside Park	Property	W. of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1172	11/5/2003				0.0000	0.0081	0	0	0.00421	< 0.0042	0	0	0.00	< 0.0042	0	0	0.00	< 0.0042		0	0	< 0.0042
1R-24136		Riverside Park	Property	S.W. of EZ	Air	Outdoor	Stationary	Field Sample	N/A	919	11/5/2003				0.0000	0.0088	0	0	0.00460	< 0.0046	0	0	0.00	< 0.0046	0	0	0.00	< 0.0046		0	0	< 0.0046
1R-24137		Riverside Park	Property	S.E. of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1166	11/5/2003				0.0007	0.0127	1	0	0.00423	0.0042	0	0	0.00	< 0.0042	0	0	0.00	< 0.0042		1	0	0.0042
1R-24138		Riverside Park	Property	E. of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1092	11/5/2003				0.0000	0.0087	0	0	0.00452	< 0.0045	0	0	0.00	< 0.0045	0	0	0.00	< 0.0045		0	0	< 0.0045
1R-21106		Riverside Park	Property	W. of EZ	Air	Outdoor	Stationary	Field Sample	N/A	694	11/6/2003				0.0000	0.0091	0	0	0.00474	< 0.0047	0	0	0.00	< 0.0047	0	0	0.00	< 0.0047		0	0	< 0.0047
1R-21107		Riverside Park	Property	S.W. of EZ	Air	Outdoor	Stationary	Field Sample	N/A	807	11/6/2003				0.0000	0.0088	0	0	0.00459	< 0.0046	0	0	0.00	< 0.0046	0	0	0.00	< 0.0046		0	0	< 0.0046
1R-21108		Riverside Park	Property	S.E. of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1158	11/6/2003				0.0000	0.0070	0	0	0.00365	< 0.0037	0	0	0.00	< 0.0037	0	0	0.00	< 0.0037		0	0	< 0.0037
1R-21109		Riverside Park	Property	E. of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1230	11/6/2003				0.0000	0.0093	0	0	0.00482	< 0.0048	0	0	0.00	< 0.0048	0	0	0.00	< 0.0048		0	0	< 0.0048
1R-21116		Riverside Park	Property	W. of EZ	Air	Outdoor	Stationary	Field Sample	N/A	836	11/7/2003				0.0000	0.0085	0	0	0.00443	< 0.0044	0	0	0.00	< 0.0044	0	0	0.00	< 0.0044		0	0	< 0.0044
1R-21117		Riverside Park	Property	S.W. of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1131	11/7/2003				0.0008	0.0131	1	0	0.00436	0.0044	0	0	0.00	< 0.0044	0	0	0.00	< 0.0044		1	0	0.0044
1R-21118		Riverside Park	Property	S.E. of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1137	11/7/2003				0.0000	0.0083	0	0	0.00434	< 0.0043	0	0	0.00	< 0.0043	0	0	0.00	< 0.0043		0	0	< 0.0043
1R-21119		Riverside Park	Property	E. of EZ	Air	Outdoor	Stationary	Field Sample	N/A	929	11/7/2003				0.0000	0.0087	0	0	0.00455	< 0.0046	0	0	0.00	< 0.0046	0	0	0.00	< 0.0046		0	0	< 0.0046
1R-24230		Riverside Park	Property	SW of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1361	11/10/2003				0.0000	0.0084	0	0	0.00435	< 0.0044	0	0	0.00	< 0.0044	0	0	0.00	< 0.0044		0	0	< 0.0044
1R-24231		Riverside Park	Property	SE of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1339	11/10/2003				0.0000	0.0085	0	0	0.00442	< 0.0044	0	0	0.00	< 0.0044	0	0	0.00	< 0.0044		0	0	< 0.0044
1R-24232		Riverside Park	Property	E of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1409	11/10/2003				0.0000	0.0081	0	0	0.00420	< 0.0042	0	0	0.00	< 0.0042	0	0	0.00	< 0.0042		0	0	< 0.0042
1R-24233		Riverside Park	Property	N of EZ	Air	Outdoor	Stationary	Field Sample	N/A	1278	11/10/2003				0.0000	0.0089	0	0	0.00463	< 0.0046	0	0	0.00	< 0.0046								

Appendix C
Libby Superfund Site Lot Blank Data
as of February 24, 2008

Appendix C - Libby Subfund Site Lot Blank Data as of February 24, 2008																																										
Note: The report excludes all Lab QC results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.																																										
Sample ID	Property Group (Location)	Sample Group	Location Description (Sub Location)	Media Type	Matrix	Sample Type	Category	Pre Post Clear	Vol (air=L)/ Area (dust= cm²)	Sample Date	Grid Open ings	Filter Status Non Analyzed	ISO Concentrations (Air = structures/cc)(Dust = structures/cm³) (METHOD - ISO 10312)																													
													Libby Amphiboles (LA)								Chrysotile (C)								Other Amphiboles (OA)													
													Excluded Structures				Structures Detected				Total Conc. LA	Total Count LA	Excluded Structures				Structures Detected				Total Conc. C	Total Count C	Excluded Structures				Structures Detected				Total Conc. OA	Total Count OA
													Aspect Ratio 5:1	Length < 0.5 u	Dia-meter > 0.5u	Length 0.5 to 5 u	Length 5 to 10 u	Length > 10 u	Aspect Ratio 5:1	Length < 0.5 u			Dia-meter > 0.5u	Length 0.5 to 5 u	Length 5 to 10 u	Length > 10 u	Aspect Ratio 5:1	Length < 0.5 u	Dia-meter > 0.5u	Length 0.5 to 5 u			Length 5 to 10 u	Length > 10 u								
1-04086	213 Granny's Garden Rd	Blank	NA	Dust	Unknown		Lot Blank	N/A		12/6/2001	10									0								0													0	
1R-09378	5000 Highway 37 N	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		9/22/2001	10									0								0												0		
1D-00128	Multiple Addresses	NA	NA	Dust	N/A		Lot Blank	N/A		4/30/2003	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1D-00367	Multiple Addresses	NA	NA	Dust	N/A		Lot Blank	N/A		6/9/2003	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1D-00368	Multiple Addresses	NA	NA	Dust	N/A		Lot Blank	N/A		6/9/2003	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1D-00369	Multiple Addresses	NA	NA	Dust	N/A		Lot Blank	N/A		6/9/2003	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1D-00377	Multiple Addresses	NA	NA	Dust	N/A		Lot Blank	N/A		6/10/2003	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1D-00378	Multiple Addresses	NA	NA	Dust	N/A		Lot Blank	N/A		6/10/2003	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1D-00379	Multiple Addresses	NA	NA	Dust	N/A		Lot Blank	N/A		6/10/2003	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1D-00533	Multiple Addresses	NA	NA	Dust	N/A		Lot Blank	N/A		6/10/2003	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1D-00534	Multiple Addresses	NA	NA	Dust	N/A		Lot Blank	N/A		6/10/2003	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1D-00535	Multiple Addresses	NA	NA	Dust	N/A		Lot Blank	N/A		6/10/2003	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1D-00536	Multiple Addresses	NA	NA	Dust	N/A		Lot Blank	N/A		6/10/2003	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1D-00537	Multiple Addresses	NA	NA	Dust	N/A		Lot Blank	N/A		6/10/2003	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1D-00538	Multiple Addresses	NA	NA	Dust	N/A		Lot Blank	N/A		6/10/2003	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1D-00539	Multiple Addresses	NA	NA	Dust	N/A		Lot Blank	N/A		6/10/2003	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1D-00540	Multiple Addresses	NA	NA	Dust	N/A		Lot Blank	N/A		6/10/2003	10		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1R-15056	Multiple Addresses	NA	NA	Air	N/A	Stationary	Lot Blank	N/A		9/9/2002	10									0								0													0	
1R-15218	Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/11/2002	10									0								0													0	
1R-15343	Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/23/2002	10									0								0													0	
1-01597	NA	Blank	Lot Blank	Air	N/A	Personal	Lot Blank	N/A		6/21/2000	10									0								0												0		
1-01828	NA	Blank	Lot Blank	Air	N/A	Personal	Lot Blank	N/A		8/29/2000	10									0								0												0		
1-01887	NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		10/5/2000	10									0								0												0		
1-03596	NA	Blank	NA	Dust	Unknown		Lot Blank	N/A		12/5/2001	10									0								0												0		
1-07143	NA	Blank	NA	Dust	N/A		Lot Blank	N/A		1/7/2003	10									0								0												0		
1-07144	NA	Blank	NA	Dust	N/A		Lot Blank	N/A		1/7/2003	10									0								0												0		
1-07145	NA	Blank	NA	Dust	N/A		Lot Blank	N/A		1/7/2003	10									0								0												0		
1-07146	NA	Blank	NA	Dust	N/A		Lot Blank	N/A		1/7/2003	10									0								0												0		
1-07147	NA	Blank	NA	Dust	N/A		Lot Blank	N/A		1/7/2003	10									0								0												0		
1R-04018	NA	Blank	Lot Blank	Air	N/A	Stationary	Lot Blank	N/A		11/16/2000	10									0								0												0		
VC-00071	NA	Blank	Lot Blank	Dust	N/A		Lot Blank	N/A		1/19/2000	10									0								0												0		
VC-00072	NA	Blank	Lot Blank	Dust	N/A		Lot Blank	N/A		1/19/2000	10									0								0												0		

Appendix C - Libby Suberfund Site Lot Blank Data as of February 24, 2008																																							
Note: The report excludes all Lab QC results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.																																							
Sample ID	Scenario	Task	Property Group (Location)	Sample Group	Location Description (Sub Location)	Media Type	Matrix	Sample Type	Category	Pre Post Clear	Vol (air=L)/ Area (dust=cm²)	Sample Date	PCN (METHOD - NIOSH 7400)																	AHERA / ASTM 5755									
													Fibers/CC	Filter Status Non Analyzed	Libby Amphiboles (LA)				Chrysotile (C)				Other Amphiboles (OA)				Total Asbestos												
															S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm²)	Asb conc (Air = S/cc) or (Dust = S/cm²)	S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm²)	Asb conc (Air = S/cc) or (Dust = S/cm²)	S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm²)	Asb conc (Air = S/cc) or (Dust = S/cm²)	Asbestos Type Identified	S<5u	S>5u	Asb conc (Air = S/cc) or (Dust = S/cm²)									
1R-13674	N/A		303 W. Thomas St	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		11/15/2001																			UNK	0	0						
1R-21218	N/A		318 Louisiana Ave	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		6/27/2003																				0	0						
1R-21219	N/A		318 Louisiana Ave	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		6/27/2003																				0	0						
1R-21220	N/A		318 Louisiana Ave	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		6/27/2003																				0	0						
1R-05626	N/A		5000 Highway 37 N	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		6/27/2001																			UNK	0	0						
1R-05627	N/A		5000 Highway 37 N	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		6/27/2001																			UNK	0	0						
1R-09378	N/A		5000 Highway 37 N	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		9/22/2001																			UNK	0	0						
1R-13572	N/A		5000 Highway 37 N	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		11/16/2001																			UNK	0	0						
1-07611	N/A		Multiple Addresses	NA	Lot 23514	Air	N/A	Stationary	Lot Blank	N/A		3/3/2003																				0	0						
1-07612	N/A		Multiple Addresses	NA	Lot 23514	Air	N/A	Stationary	Lot Blank	N/A		3/3/2003																				0	0						
1-07613	N/A		Multiple Addresses	NA	Lot 23514	Air	N/A	Stationary	Lot Blank	N/A		3/3/2003																				0	0						
1-07614	N/A		Multiple Addresses	NA	Lot 23514	Air	N/A	Stationary	Lot Blank	N/A		3/3/2003																				0	0						
1-07615	N/A		Multiple Addresses	NA	Lot 23514	Air	N/A	Stationary	Lot Blank	N/A		3/3/2003																				0	0						
1-07616	N/A		Multiple Addresses	NA	Lot 23514	Air	N/A	Stationary	Lot Blank	N/A		3/3/2003																				0	0						
1-07617	N/A		Multiple Addresses	NA	Lot 23514	Air	N/A	Stationary	Lot Blank	N/A		3/3/2003																				0	0						
1-07618	N/A		Multiple Addresses	NA	Lot 23514	Air	N/A	Stationary	Lot Blank	N/A		3/3/2003																				0	0						
1-07619	N/A		Multiple Addresses	NA	Lot 23514	Air	N/A	Stationary	Lot Blank	N/A		3/3/2003																				0	0						
1-07620	N/A		Multiple Addresses	NA	Lot 23514	Air	N/A	Stationary	Lot Blank	N/A		3/3/2003																				0	0						
1-07621	N/A		Multiple Addresses	NA	Lot 23514	Air	N/A	Stationary	Lot Blank	N/A		3/3/2003																				0	0						
1-07622	N/A		Multiple Addresses	NA	Lot 23514	Air	N/A	Stationary	Lot Blank	N/A		3/3/2003																				0	0						
1-07623	N/A		Multiple Addresses	NA	Lot 23514	Air	N/A	Stationary	Lot Blank	N/A		3/3/2003																				0	0						
1-07624	N/A		Multiple Addresses	NA	Lot 23514	Air	N/A	Stationary	Lot Blank	N/A		3/3/2003																				0	0						
1-07625	N/A		Multiple Addresses	NA	Lot 23514	Air	N/A	Stationary	Lot Blank	N/A		3/3/2003																				0	0						
1-07626	N/A		Multiple Addresses	NA	Lot 23514	Air	N/A	Stationary	Lot Blank	N/A		3/3/2003																				0	0						
1-07627	N/A		Multiple Addresses	NA	Lot 23514	Air	N/A	Stationary	Lot Blank	N/A		3/3/2003																				0	0						
1-07628	N/A		Multiple Addresses	NA	Lot 23514	Air	N/A	Stationary	Lot Blank	N/A		3/3/2003																				0	0						
1-07629	N/A		Multiple Addresses	NA	Lot 23514	Air	N/A	Stationary	Lot Blank	N/A		3/3/2003																				0	0						
1-07630	N/A		Multiple Addresses	NA	Lot 23514	Air	N/A	Stationary	Lot Blank	N/A		3/3/2003																				0	0						
1D-04245	N/A		Multiple Addresses	NA	Blank	Dust	N/A		Lot Blank	N/A	0	11/7/2005			0	0			0	0			0	0							0	0							
1R-14090	N/A		Multiple Addresses	NA	NA	Air	N/A	Stationary	Lot Blank	N/A		6/17/2002																				0	0						
1R-14506	N/A		Multiple Addresses	NA	NA	Air	N/A	Stationary	Lot Blank	N/A		8/12/2002																				0	0						
1R-15056	N/A		Multiple Addresses	NA	NA	Air	N/A	Stationary	Lot Blank	N/A		9/9/2002																				0	0						
1R-15218	N/A		Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/11/2002																				0	0						
1R-15343	N/A		Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/23/2002																				0	0						
1R-19053	N/A		Multiple Addresses	NA	NA	Air	N/A	Stationary	Lot Blank	N/A		4/11/2003																				0	0						
1R-19054	N/A		Multiple Addresses	NA	NA	Air	N/A	Stationary	Lot Blank	N/A		4/11/2003																				0	0						
1R-19055	N/A		Multiple Addresses	NA	NA	Air	N/A	Stationary	Lot Blank	N/A		4/11/2003																				0	0						
1R-19056	N/A		Multiple Addresses	NA	NA	Air	N/A	Stationary	Lot Blank	N/A		4/11/2003																				0	0						
1R-19057	N/A		Multiple Addresses	NA	NA	Air	N/A	Stationary	Lot Blank	N/A		4/11/2003																				0	0						
1R-19058	N/A		Multiple Addresses	NA	NA	Air	N/A	Stationary	Lot Blank	N/A		4/11/2003																				0	0						
1R-19059	N/A		Multiple Addresses	NA	NA	Air	N/A	Stationary	Lot Blank	N/A		4/11/2003																				0	0						
1R-19060	N/A		Multiple Addresses	NA	NA	Air	N/A	Stationary	Lot Blank	N/A		4/11/2003																				0	0						
1R-19218	N/A		Multiple Addresses	NA	NA</																																		

AHERA / ASTM 5755																																					
Sample ID	Scenario	Task	Property Group (Location)	Sample Group	Location Description (Sub Location)	Media Type	Matrix	Sample Type	Category	Pre Post Clear	Vol (air=L)/ Area (dust=cm²)	Sample Date	PCM (METHOD - NIOSH 7400)		Libby Amphiboles (LA)												Chrysotile (C)				Other Amphiboles (OA)				Total Asbestos		
													Fibers/CC	Filter Status Non Analyzed	S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm²)	Asb conc (Air = S/cc) or (Dust = S/cm²)	S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm²)	Asb conc (Air = S/cc) or (Dust = S/cm²)	S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm²)	Asb conc (Air = S/cc) or (Dust = S/cm²)	Asbestos Type Identified	S<5u	S>5u	Asb conc (Air = S/cc) or (Dust = S/cm²)							
1R-20693	N/A		Multiple Addresses	NA	NA	Air	N/A	Stationary	Lot Blank	N/A		6/2/2003																		0	0						
1R-20694	N/A		Multiple Addresses	NA	NA	Air	N/A	Stationary	Lot Blank	N/A		6/2/2003																		0	0						
1R-20695	N/A		Multiple Addresses	NA	NA	Air	N/A	Stationary	Lot Blank	N/A		6/2/2003																		0	0						
1R-20696	N/A		Multiple Addresses	NA	NA	Air	N/A	Stationary	Lot Blank	N/A		6/2/2003																		0	0						
1R-20697	N/A		Multiple Addresses	NA	NA	Air	N/A	Stationary	Lot Blank	N/A		6/2/2003																		0	0						
1R-20698	N/A		Multiple Addresses	NA	NA	Air	N/A	Stationary	Lot Blank	N/A		6/2/2003																		0	0						
1R-20699	N/A		Multiple Addresses	NA	NA	Air	N/A	Stationary	Lot Blank	N/A		6/2/2003																		0	0						
1R-20700	N/A		Multiple Addresses	NA	NA	Air	N/A	Stationary	Lot Blank	N/A		6/2/2003																		0	0						
1R-21243	N/A		Multiple Addresses	NA	NA	Air	N/A	Stationary	Lot Blank	N/A		6/24/2003																		0	0						
1R-23141	N/A		Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/19/2003			0	0			0	0			0	0						0	0						
1R-23142	N/A		Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/19/2003			0	0			0	0			0	0						0	0						
1R-23143	N/A		Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/19/2003			0	0			0	0			0	0						0	0						
1R-23144	N/A		Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/19/2003			0	0			0	0			0	0						0	0						
1R-23145	N/A		Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/19/2003			0	0			0	0			0	0						0	0						
1R-23146	N/A		Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/19/2003			0	0			0	0			0	0						0	0						
1R-23147	N/A		Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/19/2003			0	0			0	0			0	0						0	0						
1R-23148	N/A		Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/19/2003			0	0			0	0			0	0						0	0						
1R-23149	N/A		Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/19/2003			0	0			0	0			0	0						0	0						
1R-23150	N/A		Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/19/2003			0	0			0	0			0	0						0	0						
1R-23151	N/A		Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/19/2003			0	0			0	0			0	0						0	0						
1R-23152	N/A		Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/19/2003			0	0			0	0			0	0						0	0						
1R-23153	N/A		Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/19/2003			0	0			0	0			0	0						0	0						
1R-23154	N/A		Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/19/2003			0	0			0	0			0	0						0	0						
1R-23155	N/A		Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/19/2003			0	0			0	0			0	0						0	0						
1R-23156	N/A		Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/19/2003			0	0			0	0			0	0						0	0						
1R-23157	N/A		Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/19/2003			0	0			0	0			0	0						0	0						
1R-23158	N/A		Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/19/2003			0	0			0	0			0	0						0	0						
1R-23159	N/A		Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/19/2003			0	0			0	0			0	0						0	0						
1R-23160	N/A		Multiple Addresses	NA		Air	N/A	Stationary	Lot Blank	N/A		9/19/2003			0	0			0	0			0	0						0	0						
CS-13161	N/A		Multiple Addresses	NA	NA	Dust	N/A		Lot Blank	N/A		6/20/2003																		0	0						
CS-13162	N/A		Multiple Addresses	NA	NA	Dust	N/A		Lot Blank	N/A		6/20/2003																		0	0						
CS-14697	N/A		Multiple Addresses	NA	NA	Dust	N/A		Lot Blank	N/A		9/23/2003			0	0			0	0			0	0						0	0						
CS-14698	N/A		Multiple Addresses	NA	NA	Dust	N/A		Lot Blank	N/A		9/23/2003			0	0			0	0			0	0						0	0						
CS-14699	N/A		Multiple Addresses	NA	NA	Dust	N/A		Lot Blank	N/A		9/23/2003			0	0			0	0			0	0						0	0						
CS-14700	N/A		Multiple Addresses	NA	NA	Dust	N/A		Lot Blank	N/A		9/23/2003			0	0			0	0			0	0						0	0						
1-07148	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		1/7/2003																		0	0						
1-07158	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		1/7/2003																		0	0						
1-07159	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		1/7/2003																		0	0						
1-07160	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		1/7/2003																		0	0						
1-07161	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		1/7/2003																		0	0						
1-07162	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		1/7/2003																									

Sample ID	Scenario	Task	Property Group (Location)	Sample Group	Location Description (Sub Location)	Media Type	Matrix	Sample Type	Category	Pre Post Clear	Vol (air=L)/ Area (dust=cm ²)	Sample Date	PCM (METHOD - NIOSH 7400)		AHERA / ASTM 5755																
													Fibers/CC	Filter Status Non Analyzed	Libby Amphiboles (LA)				Chrysotile (C)				Other Amphiboles (OA)				Total Asbestos				
															S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm ²)	Asb conc (Air = S/cc) or (Dust = S/cm ²)	S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm ²)	Asb conc (Air = S/cc) or (Dust = S/cm ²)	S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm ²)	Asb conc (Air = S/cc) or (Dust = S/cm ²)	Asbestos Type Identified	S<5u	S>5u	Asb conc (Air = S/cc) or (Dust = S/cm ²)	
1D-04247	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	11/7/2005				0	0			0	0			0	0				0	0	
1D-04248	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	11/7/2005				0	0			0	0			0	0				0	0	
1D-04249	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	11/7/2005				0	0			0	0			0	0				0	0	
1D-04250	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	11/7/2005				0	0			0	0			0	0				0	0	
1D-04251	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	11/7/2005				0	0			0	0			0	0				0	0	
1D-04252	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	11/7/2005				0	0			0	0			0	0				0	0	
1D-04253	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	11/7/2005				0	0			0	0			0	0				0	0	
1D-04254	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	11/7/2005				0	0			0	0			0	0				0	0	
1D-04255	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	11/7/2005				0	0			0	0			0	0				0	0	
1D-04256	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	11/7/2005				0	0			0	0			0	0				0	0	
1D-04257	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A		11/7/2005				0	0			0	0			0	0				0	0	
1D-04258	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	11/7/2005				0	0			0	0			0	0				0	0	
1D-04259	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	11/7/2005				0	0			0	0			0	0				0	0	
1D-04260	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	11/7/2005				0	0			0	0			0	0				0	0	
1D-04971	N/A		NA	Blank	Lot blank	Dust	N/A		Lot Blank	N/A	0	7/26/2006				0	0			0	0			0	0				0	0	
1D-04972	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	7/26/2006				0	0			0	0			0	0				0	0	
1D-04973	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	7/26/2006				0	0			0	0			0	0				0	0	
1D-04974	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	7/26/2006				0	0			0	0			0	0				0	0	
1D-04975	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	7/26/2006				0	0			0	0			0	0				0	0	
1D-04976	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	7/26/2006				0	0			0	0			0	0				0	0	
1D-04977	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	7/26/2006				0	0			0	0			0	0				0	0	
1D-04978	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	7/26/2006				0	0			0	0			0	0				0	0	
1D-05041	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	3/20/2006				0	0			0	0			0	0				0	0	
1D-05042	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	3/20/2006				0	0			0	0			0	0				0	0	
1D-05043	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	3/20/2006				0	0			0	0			0	0				0	0	
1D-05044	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	3/20/2006				0	0			0	0			0	0				0	0	
1D-05045	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	3/20/2006				0	0			0	0			0	0				0	0	
1D-05046	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	3/20/2006				0	0			0	0			0	0				0	0	
1D-05047	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	3/20/2006				0	0			0	0			0	0				0	0	
1D-05048	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	3/20/2006				0	0			0	0			0	0				0	0	
1D-05842	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	5/4/2006				0	0			0	0			0	0				0	0	
1D-05843	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	5/4/2006				0	0			0	0			0	0				0	0	
1D-05844	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	5/4/2006				0	0			0	0			0	0				0	0	
1D-05940	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	5/8/2006				0	0			0	0			0	0				0	0	
1D-05961	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	5/8/2006				0	0			0	0			0	0				0	0	
1D-05962	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	5/8/2006				0	0			0	0			0	0				0	0	
1D-05963	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	5/8/2006				0	0			0	0			0	0				0	0	
1D-05964	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	5/8/2006				0	0			0	0			0	0				0	0	
1D-05965	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	5/8/2006				0	0			0	0			0	0				0	0	
1D-06970	N/A		NA	Blank	Blank	Dust	N/A		Lot Blank	N/A	0	9/20/2006				0	0			0	0			0	0				0	0	
1D-06971	N/A																														

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Sample ID	Scenario	Task	Property Group (Location)	Sample Group	Location Description (Sub Location)	Media Type	Matrix	Sample Type	Category	Pre Post Clear	Vol (air=L)/ Area (dust=cm²)	Sample Date	PCM (METHOD - NIOSH 7400)		AHERA / ASTM 5755																
													Fibers/CC	Filter Status Non Analyzed	Libby Amphiboles (LA)				Chrysotile (C)				Other Amphiboles (OA)				Total Asbestos				
															S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm²)	Asb conc (Air = S/cc) or (Dust = S/cm²)	S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm²)	Asb conc (Air = S/cc) or (Dust = S/cm²)	S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm²)	Asb conc (Air = S/cc) or (Dust = S/cm²)	Asbestos Type Identified	S<5u	S>5u	Asb conc (Air = S/cc) or (Dust = S/cm²)	
1R-28084	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		11/3/2004			0	0			0	0			0	0					0	0	
1R-28085	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		11/3/2004			0	0			0	0			0	0					0	0	
1R-28086	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		11/3/2004			0	0			0	0			0	0					0	0	
1R-28087	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		11/3/2004			0	0			0	0			0	0					0	0	
1R-28088	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		11/3/2004			0	0			0	0			0	0					0	0	
1R-29309	N/A		NA	Blank	Lot Blank	Air	N/A	Stationary	Lot Blank	N/A		3/31/2005			0	0			0	0			0	0					0	0	
1R-29310	N/A		NA	Blank	Lot Blank	Air	N/A	Stationary	Lot Blank	N/A		3/31/2005			0	0			0	0			0	0					0	0	
1R-29311	N/A		NA	Blank	Lot Blank	Air	N/A	Stationary	Lot Blank	N/A		3/31/2005			0	0			0	0			0	0					0	0	
1R-29312	N/A		NA	Blank	Lot Blank	Air	N/A	Stationary	Lot Blank	N/A		3/31/2005			0	0			0	0			0	0					0	0	
1R-29313	N/A		NA	Blank	Lot Blank	Air	N/A	Stationary	Lot Blank	N/A		3/31/2005			0	0			0	0			0	0					0	0	
1R-29314	N/A		NA	Blank	Lot Blank	Air	N/A	Stationary	Lot Blank	N/A		3/31/2005			0	0			0	0			0	0					0	0	
1R-29315	N/A		NA	Blank	Lot Blank	Air	N/A	Stationary	Lot Blank	N/A		3/31/2005			0	0			0	0			0	0					0	0	
1R-29316	N/A		NA	Blank	Lot Blank	Air	N/A	Stationary	Lot Blank	N/A		3/31/2005			0	0			0	0			0	0					0	0	
1R-29317	N/A		NA	Blank	Lot Blank	Air	N/A	Stationary	Lot Blank	N/A		3/31/2005			0	0			0	0			0	0					0	0	
1R-29318	N/A		NA	Blank	Lot Blank	Air	N/A	Stationary	Lot Blank	N/A		3/31/2005			0	0			0	0			0	0					0	0	
1R-29319	N/A		NA	Blank	Lot Blank	Air	N/A	Stationary	Lot Blank	N/A		3/31/2005			0	0			0	0			0	0					0	0	
1R-29320	N/A		NA	Blank	Lot Blank	Air	N/A	Stationary	Lot Blank	N/A		3/31/2005			0	0			0	0			0	0					0	0	
1R-29321	N/A		NA	Blank	Lot Blank	Air	N/A	Stationary	Lot Blank	N/A		3/31/2005			0	0			0	0			0	0					0	0	
1R-29322	N/A		NA	Blank	Lot Blank	Air	N/A	Stationary	Lot Blank	N/A		3/31/2005			0	0			0	0			0	0					0	0	
1R-29323	N/A		NA	Blank	Lot Blank	Air	N/A	Stationary	Lot Blank	N/A		3/31/2005			0	0			0	0			0	0					0	0	
1R-29324	N/A		NA	Blank	Lot Blank	Air	N/A	Stationary	Lot Blank	N/A		3/31/2005			0	0			0	0			0	0					0	0	
1R-29325	N/A		NA	Blank	Lot Blank	Air	N/A	Stationary	Lot Blank	N/A		3/31/2005			0	0			0	0			0	0					0	0	
1R-29326	N/A		NA	Blank	Lot Blank	Air	N/A	Stationary	Lot Blank	N/A		3/31/2005			0	0			0	0			0	0					0	0	
1R-29327	N/A		NA	Blank	Lot Blank	Air	N/A	Stationary	Lot Blank	N/A		3/31/2005			0	0			0	0			0	0					0	0	
1R-29328	N/A		NA	Blank	Lot Blank	Air	N/A	Stationary	Lot Blank	N/A		3/31/2005			0	0			0	0			0	0					0	0	
1R-30268	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		3/22/2006			0	0			0	0			0	0					0	0	
1R-30392	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		5/26/2005			0	0			0	0			0	0					0	0	
1R-30393	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		5/26/2005			0	0			0	0			0	0					0	0	
1R-30394	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		5/26/2005			0	0			0	0			0	0					0	0	
1R-30395	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		5/26/2005			0	0			0	0			0	0					0	0	
1R-30396	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		5/26/2005			0	0			0	0			0	0					0	0	
1R-30397	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		5/26/2005			0	0			0	0			0	0					0	0	
1R-30398	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		5/26/2005			0	0			0	0			0	0					0	0	
1R-30399	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		5/26/2005			0	0			0	0			0	0					0	0	
1R-30400	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		5/26/2005			0	0			0	0			0	0					0	0	
1R-30401	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		5/26/2005			0	0			0	0			0	0					0	0	
1R-30402	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		5/26/2005			0	0			0	0			0	0					0	0	
1R-30403	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		5/26/2005			0	0			0	0			0	0					0	0	
1R-30404	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		5/26/2005			0	0			0	0			0	0					0	0	
1R-30405	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		5/26/2005			0	0			0	0			0	0					0	0	
1R																															

Sample ID	Scenario	Task	Property Group (Location)	Sample Group	Location Description (Sub Location)	Media Type	Matrix	Sample Type	Category	Pre Post Clear	Vol (air=L)/ Area (dust=cm ²)	Sample Date	PCM (METHOD - NIOSH 7400)		AHERA / ASTM 5755																
													Fibers/CC	Filter Status Non Analyzed	Libby Amphiboles (LA)				Chrysotile (C)				Other Amphiboles (OA)				Total Asbestos				
															S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm ²)	Asb conc (Air = S/cc) or (Dust = S/cm ²)	S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm ²)	Asb conc (Air = S/cc) or (Dust = S/cm ²)	S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm ²)	Asb conc (Air = S/cc) or (Dust = S/cm ²)	Asbestos Type Identified	S<5u	S>5u	Asb conc (Air = S/cc) or (Dust = S/cm ²)	
1R-32614	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		8/4/2005				0	0			0	0			0	0				0	0	
1R-32615	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		8/4/2005				0	0			0	0			0	0				0	0	
1R-32616	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		8/4/2005				0	0			0	0			0	0				0	0	
1R-32617	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		8/4/2005				0	0			0	0			0	0				0	0	
1R-32618	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		8/4/2005				0	0			0	0			0	0				0	0	
1R-32619	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		8/4/2005				0	0			0	0			0	0				0	0	
1R-33518	N/A		NA	Blank	NA	Air	N/A	Personal	Lot Blank	N/A		10/4/2005				0	0			0	0			0	0				0	0	
1R-33519	N/A		NA	Blank	Blank	Air	N/A	Personal	Lot Blank	N/A		10/4/2005				0	0			0	0			0	0				0	0	
1R-33731	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		10/4/2005				0	0			0	0			0	0				0	0	
1R-33732	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		10/4/2005				0	0			0	0			0	0				0	0	
1R-33733	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		10/4/2005				0	0			0	0			0	0				0	0	
1R-33805	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		10/4/2005				0	0			0	0			0	0				0	0	
1R-33806	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		10/4/2005				0	0			0	0			0	0				0	0	
1R-33807	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		10/4/2005				0	0			0	0			0	0				0	0	
1R-33808	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		10/4/2005				0	0			0	0			0	0				0	0	
1R-33809	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		10/4/2005				0	0			0	0			0	0				0	0	
1R-33810	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		10/4/2005				0	0			0	0			0	0				0	0	
1R-33811	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		10/4/2005				0	0			0	0			0	0				0	0	
1R-33812	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		10/4/2005				0	0			0	0			0	0				0	0	
1R-33813	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		10/4/2005				0	0			0	0			0	0				0	0	
1R-33814	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		10/4/2005				0	0			0	0			0	0				0	0	
1R-33815	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		10/4/2005				0	0			0	0			0	0				0	0	
1R-33816	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		10/4/2005				0	0			0	0			0	0				0	0	
1R-33817	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		10/4/2005				0	0			0	0			0	0				0	0	
1R-33818	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		10/4/2005				0	0			0	0			0	0				0	0	
1R-33819	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		10/4/2005				0	0			0	0			0	0				0	0	
1R-34016	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		3/22/2006				0	0			0	0			0	0				0	0	
1R-34017	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		3/22/2006				0	0			0	0			0	0				0	0	
1R-34018	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		3/22/2006				0	0			0	0			0	0				0	0	
1R-34019	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		3/22/2006				0	0			0	0			0	0				0	0	
1R-34275	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		3/22/2006				0	0			0	0			0	0				0	0	
1R-34276	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		3/22/2006				0	0			0	0			0	0				0	0	
1R-34277	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		3/22/2006				0	0			0	0			0	0				0	0	
1R-34278	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		3/22/2006				0	0			0	0			0	0				0	0	
1R-34279	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		3/22/2006				0	0			0	0			0	0				0	0	
1R-34794	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		3/23/2006				0	0			0	0			0	0				0	0	
1R-34795	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		3/23/2006				0	0			0	0			0	0				0	0	
1R-34796	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		3/23/2006				0	0			0	0			0	0				0	0	
1R-34797	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		3/23/2006				0	0			0	0			0	0				0	0	
1R-34798	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		3/23/2006				0	0			0	0			0							

Sample ID	Scenario	Task	Property Group (Location)	Sample Group	Location Description (Sub Location)	Media Type	Matrix	Sample Type	Category	Pre Post Clear	Vol (air=L)/ Area (dust=cm ²)	Sample Date	PCM (METHOD - NIOSH 7400)		AHERA / ASTM 5755														
															Fibers/CC	Filter Status Non Analyzed	Libby Amphiboles (LA)				Chrysotile (C)				Other Amphiboles (OA)				Total Asbestos
													S<5u	S>5u			Analytical Sensitivity (Air = S/cc) or (Dust = S/cm ²)	Asb conc (Air = S/cc) or (Dust = S/cm ²)	S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm ²)	Asb conc (Air = S/cc) or (Dust = S/cm ²)	S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm ²)	Asb conc (Air = S/cc) or (Dust = S/cm ²)	Asbestos Type Identified	S<5u	S>5u
1R-38662	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		9/20/2006			0	0			0	0			0	0			0	0	
1R-38663	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		9/20/2006			0	0			0	0			0	0			0	0	
1R-38664	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		9/20/2006			0	0			0	0			0	0			0	0	
1R-38665	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		9/20/2006			0	0			0	0			0	0			0	0	
1R-38666	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		9/20/2006			0	0			0	0			0	0			0	0	
1R-38667	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		9/20/2006			0	0			0	0			0	0			0	0	
1R-38668	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		9/20/2006			0	0			0	0			0	0			0	0	
1R-38669	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		9/20/2006			0	0			0	0			0	0			0	0	
1R-38670	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		9/20/2006			0	0			0	0			0	0			0	0	
1R-38671	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		9/20/2006			0	0			0	0			0	0			0	0	
1R-38672	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		9/20/2006			0	0			0	0			0	0			0	0	
1R-38673	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		9/20/2006			0	0			0	0			0	0			0	0	
1R-38674	N/A		NA	Blank	Blank	Air	N/A	Stationary	Lot Blank	N/A		9/20/2006			0	0			0	0			0	0			0	0	
1R-38675	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		9/20/2006			0	0			0	0			0	0			0	0	
1R-38676	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		9/20/2006			0	0			0	0			0	0			0	0	
1R-38677	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		9/20/2006			0	0			0	0			0	0			0	0	
1R-38678	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		9/20/2006			0	0			0	0			0	0			0	0	
CS-16435	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		11/6/2003			0	0			0	0			0	0			0	0	0
CS-16436	N/A		NA	Blank	NA	Dust	N/A		Lot Blank	N/A	0	11/6/2003			0	0			0	0			0	0			0	0	0
CS-17461	N/A		NA	Blank	NA	Dust	N/A		Lot Blank	N/A		9/23/2003			0	0			0	0			0	0			0	0	
CS-17462	N/A		NA	Blank	NA	Dust	N/A		Lot Blank	N/A		9/23/2003			0	0			0	0			0	0			0	0	
CS-17463	N/A		NA	Blank	NA	Dust	N/A		Lot Blank	N/A		9/23/2003			0	0			0	0			0	0			0	0	
CS-17464	N/A		NA	Blank	NA	Dust	N/A		Lot Blank	N/A		9/23/2003			0	0			0	0			0	0			0	0	
CS-17465	N/A		NA	Blank	NA	Dust	N/A		Lot Blank	N/A		9/23/2003			0	0			0	0			0	0			0	0	
CS-17466	N/A		NA	Blank	NA	Dust	N/A		Lot Blank	N/A		9/23/2003			0	0			0	0			0	0			0	0	
CS-17467	N/A		NA	Blank	NA	Dust	N/A		Lot Blank	N/A		9/23/2003			0	0			0	0			0	0			0	0	
CS-17468	N/A		NA	Blank	NA	Dust	N/A		Lot Blank	N/A		9/23/2003			0	0			0	0			0	0			0	0	
CS-17469	N/A		NA	Blank	NA	Dust	N/A		Lot Blank	N/A		9/23/2003			0	0			0	0			0	0			0	0	
CS-17470	N/A		NA	Blank	NA	Dust	N/A		Lot Blank	N/A		9/23/2003			0	0			0	0			0	0			0	0	
CS-17471	N/A		NA	Blank	NA	Dust	N/A		Lot Blank	N/A		9/23/2003			0	0			0	0			0	0			0	0	
CS-17472	N/A		NA	Blank	NA	Dust	N/A		Lot Blank	N/A		9/23/2003			0	0			0	0			0	0			0	0	
CS-17473	N/A		NA	Blank	NA	Dust	N/A		Lot Blank	N/A		9/23/2003			0	0			0	0			0	0			0	0	
CS-17474	N/A		NA	Blank	NA	Dust	N/A		Lot Blank	N/A		9/23/2003			0	0			0	0			0	0			0	0	
CS-17475	N/A		NA	Blank	NA	Dust	N/A		Lot Blank	N/A		9/23/2003			0	0			0	0			0	0			0	0	
CS-17476	N/A		NA	Blank	NA	Dust	N/A		Lot Blank	N/A		9/23/2003			0	0			0	0			0	0			0	0	
CS-18917	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		2/26/2004			0	0			0	0			0	0			0	0	
CS-18918	N/A		NA	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		2/26/2004			0	0			0	0			0	0			0	0	
1R-04659	N/A		Rainy Creek Rd	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		5/12/2001													UNK	0	0		
1R-04660	N/A		Rainy Creek Rd	Blank	NA	Air	N/A	Stationary	Lot Blank	N/A		5/12/2001													UNK	0	0		

Appendix C - Libby Suberfund Site Lot Blank Data as of February 24, 2008																																				
Note: The report excludes all Lab QC results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.																																				
Property Group (Location)	Sample ID	Parent ID	Sample Date	Field Sample Data Sheet Number	Logbook Number	Media Type	Sample Type	Matrix	Category	Location ID	Sample Group	Location Description (Sub Location)	Field Comments	SSN (last 4 digits)	Scenario	Task	Pre Post Clear	Vol (Air=L) or Area (Dust=cm²)	PCM (METHOD - NIOSH 7400) Fibers/cc	AHERA / ASTM 5755																
																				Filter Status Non Analyzed	Libby Amphiboles (LA)				Chrysotile (C)				Other Amphiboles (OA)				Total Asbestos			
																					S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm²)	Asb conc (Air = S/cc) or (Dust = S/cm²)	S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm²)	Asb conc (Air = S/cc) or (Dust = S/cm²)	S<5u	S>5u	Analytical Sensitivity (Air = S/cc) or (Dust = S/cm²)	Asb conc (Air = S/cc) or (Dust = S/cm²)	Asbestos Type Identified	S<5u	S>5u	Asb conc (Air = S/cc) or (Dust = S/cm²)
NA	AA-00201		10/13/2006	SA-004968	100663	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Lot blank	Lot #12609	N/A			N/A				0	0					0	0			0	0				
NA	AA-00202		10/13/2006	SA-004968	100663	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Lot blank	Lot #12609	N/A			N/A				0	0					0	0			0	0				
NA	AA-00341		11/15/2006	SA-005086	100673	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13409	N/A			N/A				0	0					0	0			0	0				
NA	AA-00342		11/15/2006	SA-005086	100673	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13409	N/A			N/A				0	0					0	0			0	0				
NA	AA-00343		11/15/2006	SA-005086	100673	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13409	N/A			N/A				0	0					0	0			0	0				
NA	AA-00344		11/15/2006	SA-005087	100673	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13409	N/A			N/A				0	0					0	0			0	0				
NA	AA-00345		11/15/2006	SA-005087	100673	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13409	N/A			N/A				0	0					0	0			0	0				
NA	AA-00346		11/15/2006	SA-005087	100673	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13409	N/A			N/A				0	0					0	0			0	0				
NA	AA-00347		11/15/2006	SA-005088	100673	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13409	N/A			N/A				0	0					0	0			0	0				
NA	AA-00348		11/15/2006	SA-005088	100673	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13409	N/A			N/A				0	0					0	0			0	0				
NA	AA-00349		11/15/2006	SA-005088	100673	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13409	N/A			N/A				0	0					0	0			0	0				
NA	AA-00350		11/15/2006	SA-005089	100673	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13409	N/A			N/A				0	0					0	0			0	0				
NA	AA-00596		1/22/2007	SA-004886	100614	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Cassette Lot #13518	N/A			N/A				0	0					0	0			0	0				
NA	AA-00597		1/22/2007	SA-004886	100614	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Cassette Lot #13518	N/A			N/A				0	0					0	0			0	0				
NA	AA-00598		1/22/2007	SA-004886	100614	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Cassette Lot #13518	N/A			N/A				0	0					0	0			0	0				
NA	AA-00599		1/22/2007	SA-005054	100614	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Cassette Lot #13518	N/A			N/A				0	0					0	0			0	0				
NA	AA-00600		1/22/2007	SA-005054	100614	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Cassette Lot #13518	N/A			N/A				0	0					0	0			0	0				
NA	AA-00601		1/22/2007	SA-005054	100614	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Cassette Lot #13518	N/A			N/A				0	0					0	0			0	0				
NA	AA-00602		1/22/2007	SA-005055	100614	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Cassette Lot #13518	N/A			N/A				0	0					0	0			0	0				
NA	AA-00603		1/22/2007	SA-005055	100614	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Cassette Lot #13518	N/A			N/A				0	0					0	0			0	0				
NA	AA-00604		1/22/2007	SA-005055	100614	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Cassette Lot #13518	N/A			N/A				0	0					0	0			0	0				
NA	AA-00605		1/22/2007	SA-005056	100614	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Cassette Lot #13518	N/A			N/A				0	0					0	0			0	0				
NA	AA-00841		3/8/2007	SA-005601	100689	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13843	N/A			N/A				0	0					0	0			0	0				
NA	AA-00842		3/8/2007	SA-005601	100689	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13843	N/A			N/A				0	0					0	0			0	0				
NA	AA-00843		3/8/2007	SA-005601	100689	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13843	N/A			N/A				0	0					0	0			0	0				
NA	AA-00844		3/8/2007	SA-005602	100689	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13843	N/A			N/A				0	0					0	0			0	0				
NA	AA-00845		3/8/2007	SA-005602	100689	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13843	N/A			N/A				0	0					0	0			0	0				
NA	AA-00846		3/8/2007	SA-005602	100689	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13843	N/A			N/A				0	0					0	0			0	0				
NA	AA-00847		3/8/2007	SA-005603	100689	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13843	N/A			N/A				0	0					0	0			0	0				
NA	AA-00848		3/8/2007	SA-005603	100689	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13843	N/A			N/A				0	0					0	0			0	0				
NA	AA-00849		3/8/2007	SA-005603	100689	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13843	N/A			N/A				0	0					0	0			0	0				
NA	AA-00850		3/8/2007	SA-005604	100689	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13843	N/A			N/A				0	0					0	0			0	0				
NA	AA-00851		3/8/2007	SA-005604	100689	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13843	N/A			N/A				0	0					0	0			0	0				
NA	AA-00852		3/8/2007	SA-005604	100689	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13843	N/A			N/A				0	0					0	0			0	0				
NA	AA-00853		3/8/2007	SA-005605	100689	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13843	N/A			N/A				0	0					0	0			0	0				
NA	AA-00854		3/8/2007	SA-005605	100689	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13843	N/A			N/A				0	0					0	0			0	0				
NA	AA-00855		3/8/2007	SA-005605	100689	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13843	N/A			N/A				0	0					0	0			0	0				
NA	AA-00856		3/8/2007	SA-005606	100689	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13483	N/A			N/A				0	0					0	0			0	0				
NA	AA-00857		3/8/2007	SA-005606	100689	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13483	N/A			N/A				0	0					0	0			0	0				
NA	AA-00858		3/8/2007	SA-005606	100689	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13483	N/A			N/A				0	0					0	0			0	0				
NA	AA-00859		3/8/2007	SA-005607	100689	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13483	N/A			N/A				0	0					0	0			0	0				
NA	AA-00860		3/8/2007	SA-005607	100689	Air	Stationary	N/A	Lot Blank	AD-000001	Blank	Blank	Lot #13483	N/A			N/A				0	0					0	0			0	0				

Appendix D
OU1 Field Blank Data as of February 24, 2008

Appendix D -OU1 Field Blank Data as of February 24, 2008																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
Note: The report excludes all Lab QC results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
Property Group (Location)	Sample ID	Parent ID	Sample Date	Field Sample Data Sheet Number	Logbook Number	Media Type	Sample Type	Matrix	Category	Location ID	Sample Group	Location Description (Sub Location)	Field Comments	SSN (last 4 digits)	Scenario	Task	Pre Post Clear	Vol (Air=L) or Area (Dust=cm²)	ISO Concentration (Air=Structures/cc)/(Dust=Structures/cm³) (Method - ISO 10312)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
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IndexID values: LIKE "1r-%" Server-Database: \\204.47.48.35\libby2

Property Group (Location)	Sample ID	Parent ID	Sample Date	Field Sample Data Sheet Number	Logbook Number	Media Type	Sample Type	Matrix	Category	Location ID	Sample Group	Location Description (Sub Location)	Field Comments	SSN (last 4 digits)	Scenario	Task	Pre Post Clear	Vol (Air=L) or Area (Dust=cm²)	Grid Open Ings	Filter Status Non Analyzed	ISO Concentration (Air=Structures/cc)(Dust=Structures/cm²) (Method - ISO 10312)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																										
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1735 Missoula Ave	AA-01393		12/24/2007	SA-007497	100916	Air	Stationary	N/A	Field Blank	SP-131934	Blank	AA-Blank	Event #31; Blank prepared 12/24/07; Lot #14862		N/A		N/A	55			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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Appendix E
Ambient Air Co-located Sample Results
as of February 18, 2008

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IndexID values: LIKE "aa%"
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IndexID values: LIKE "aa%" Server-Database: \\204.47.48.36\libby2

Property Group (Location)	Sample ID	Parent ID	Sample Date	Field Sample Data Sheet Number	Logbook Number	Media Type	Sample Type	Matrix	Category	Location ID	Sample Group	Location Description (Sub Location)	Field Comments	SSN (last 4 digits)	Scenario	Task	Pre Post Clear	Vol (Air=L) or Area (Dust=cm²)	ISO Concentration (Air=Structures/cc)/(Dust=Structures/cm³) (Method - ISO 10312)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
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899 Farm to Market Rd	AA-01073		5/2/2007	SA-006018	100746	Air	Stationary	Outdoor	Field Sample	SP-131932	Property	AA-CO-HV-05	Event 20; Collected from 5/2/07 to 5/7/07; Lot #13843		N/A		N/A	14300	55		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0</

Appendix F
Ambient Air Preparation (Drying) Blank
Sample Results as of February 18, 2008

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IndexID values: LIKE "aa%"
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Appendix G
OU1 Equipment Blank Sample Results as
of April 27, 2007

Appendix G - OU1 Equipment Blank Data as of April 27, 2007

Note: The report excludes all Lab QC results, such as those associated with Lab Blanks, Lab Duplicates, Re-Preparation, Re-count Same, Re-count Different, Verified Analysis, etc.

Sample ID	Parent ID	Scenario	Property Group (Location)	Sample Group	Location Description (Sub Location)	Media Type	Matrix	Category	Sample Date	PLM				
										Method	LA Bin		LA (%)	C (%)
CS-16697-FG		N/A	NA	Blank	NA	Soil-Like	Soil	Equipment Blank	9/9/2003	PLM-VE	A	ND		ND
CS-16822-FG		N/A	NA	Blank	NA	Soil-Like	Soil	Equipment Blank	9/10/2003	PLM-VE	A	ND		ND
CS-16847-FG		N/A	NA	Blank	NA	Soil-Like	Soil	Equipment Blank	9/12/2003	PLM-VE	A	ND		ND
CS-16863-FG		N/A	NA	Blank	NA	Soil-Like	Soil	Equipment Blank	9/13/2003	PLM-VE	A	ND		ND

Appendix H

Modifications to Governing Documents

Appendix H

Details Regarding Modifications to Governing Documents

Phase 1 SQAPP, Revision 0 (EPA 1999)

No deviations to procedures outlined in this document were noted.

Phase 1 SQAPP, Revision 1 (EPA 2000a)

- Effective August 29, 2001: To decontaminate air and dust sampling equipment, locally available filtered water will be used rather than deionized water.
- Effective August 30, 2001: On field sample data sheets, separate 10-digit and 6-digit sample identifiers (IDs) will not be used to label samples; rather, only the 6-digit (e.g., 1-XXXXX) ID will be used.
- Effective December 4, 2001: Rotometer calibration will be conducted once per month rather than once per week as stated in standard operating procedure (SOP) EPA-Libby-01, Revision 1.
- Effective December 4, 2001: Since the procedure for completing field sample data sheets (SOP ISSI-Libby-04) was omitted from the guidance document, field sample data sheets will be completed using examples prepared and maintained in the field by the field manager.
- Effective December 10, 2001: EPA-approved chain-of-custody (COC) forms specific to asbestos sampling will be used rather than the standard COC form provided in the SOP for sample custody and handling (CDM SOP 1-2).
- Effective December 10, 2001: Sample labels will only contain the sample ID number rather than detailed information (e.g., sample date, sample time, etc.).
- Effective December 10, 2001: Soil samples will not be collected in pans, trays, or bowls as required by CDM SOP 1-3 (Surface Soil Sampling); rather, material will be placed directly into plastic zip-top bags and homogenized. Core samplers or bulb planters will be used when necessary to collect subsamples of approximately equal volume. In addition, ice will not be used for packaging.
- Effective December 10, 2001: As stated in CDM SOP 2-1 (Packaging and Shipping of Environmental Samples), asbestos samples (all media) will not be packaged for handling or shipment using vermiculite or ice.
- Effective December 10, 2001: Locally available deionized water will be used to decontaminate sampling implements and equipment (e.g., air sampling pumps, trowels, bulb planters, etc.) rather than deionized water, as stated in CDM's SOP for Field Equipment Decontamination at Nonradioactive Sites (CDM SOP 4-5). In addition, waste water will be disposed of onsite and not captured.

- Effective December 10, 2001: Dust samples will be collected over three 100-square centimeter (cm²) areas rather than a single 100-cm² area as called for by the American Society for Testing and Materials method D5755-95.

Removal Action SAP, Revision 1 (EPA 2000b)

- Effective December 4, 2001: Rotometer calibration will be conducted once per month rather than once per week as stated in SOP EPA-Libby-01, Revision 1.
- Effective December 10, 2001: Meteorological station data will only be collected at critical removal actions, as deemed by the government.

Final Remedial Investigation and Removal Action Work Plan for Riverside Park (CDM 2003a)

- Vermiculite was observed in one soil subsample location; therefore, only four subsamples were collected rather than five.
- Four proposed riverbank sample locations were not sampled due to visible vermiculite.
- One offset test pit was not excavated due to its proximity to another test pit.
- One offset test pit was excavated at a 30-foot interval versus the required 50-foot interval due to interference by fiber optic cable marking.
- One offset test pit was not excavated because the offset location was in the Kootenai River.

OU4 Ambient Air SAP (CDM and SRC 2006)

- Effective September 9, 2007: The sampling frequency and number of sampling locations was reduced for the OU4 Libby Site-wide ambient air monitoring locations.

Appendix I

Exposure Questionnaires

Appendix I-1
Exposure Questionnaire - OU1 Former Export Plant
Search and Rescue Volunteers

Survey	EF at OU1 (days/yr)	ET at OU1 (hours/day)	As Reported		Adjusted (a)		As Reported		Adjusted (a)		Time Indoor meeting room active (%)	Time Indoor meeting room passive (%)	Start age	Stop age reported	Stop age assumed (b)	Calculated Values									
			Time Indoors (%)	Time Outdoors (%)	Time Indoors (%)	Time Outdoors (%)	% Indoor Time in Garage	% Indoor Time in Meeting Room	% Indoor Time in Garage	% Indoor Time in Meeting Room						ET (outdoor)	ET (indoor)	ET (meeting room - active)	ET (meeting room - passive)	ET (garage - active)	TWF (outdoor)	TWF (indoor)	TWF (meeting room - active)	TWF (meeting room - passive)	TWF (garage - active)
1	45	2	75%	25%	75%	25%	25%	75%	25%	75%	5%	95%	36	60	60	0.50	1.50	0.06	1.07	0.38	2.6E-03	7.7E-03	2.9E-04	5.5E-03	1.9E-03
2	60	2	25%	60%	29%	71%	10%	20%	33%	67%	5%	95%	60	68	68	1.41	0.59	0.02	0.37	0.20	9.7E-03	4.0E-03	1.3E-04	2.6E-03	1.3E-03
3	35	4	10%	90%	10%	90%	10%	90%	10%	90%	5%	95%	25	100	80	3.60	0.40	0.02	0.34	0.04	1.4E-02	1.6E-03	7.2E-05	1.4E-03	1.6E-04
4	104	2	75%	25%	75%	25%	25%	75%	25%	75%	50%	50%	50	80	80	0.50	1.50	0.56	0.56	0.38	5.9E-03	1.8E-02	6.7E-03	6.7E-03	4.5E-03
5	50	2	85%	15%	85%	15%	25%	75%	25%	75%	10%	90%	35	65	65	0.30	1.70	0.13	1.15	0.43	1.7E-03	9.7E-03	7.3E-04	6.5E-03	2.4E-03
6	100	2	80%	20%	80%	20%	40%	60%	40%	60%	5%	95%	40	60	60	0.40	1.60	0.05	0.91	0.64	4.6E-03	1.8E-02	5.5E-04	1.0E-02	7.3E-03
7	25	3	80%	20%	80%	20%	25%	70%	26%	74%	50%	50%	37	?	70	0.60	2.40	0.88	0.88	0.63	1.7E-03	6.8E-03	2.5E-03	2.5E-03	1.8E-03
8	35	4	80%	20%	80%	20%	20%	80%	20%	80%	0%	100%	22	100	80	0.80	3.20	0.00	2.56	0.64	3.2E-03	1.3E-02	0.0E+00	1.0E-02	2.6E-03
9	20	2	90%	10%	90%	10%	50%	50%	50%	50%	10%	90%	41	90	80	0.20	1.80	0.09	0.81	0.90	4.6E-04	4.1E-03	2.1E-04	1.8E-03	2.1E-03
10	42	4	80%	20%	80%	20%	10%	90%	10%	90%	20%	80%	49	65	65	0.80	3.20	0.58	2.30	0.32	3.8E-03	1.5E-02	2.8E-03	1.1E-02	1.5E-03
11	30	2	90%	10%	90%	10%	10%	80%	11%	89%	2%	98%	55	67	67	0.20	1.80	0.03	1.57	0.20	6.8E-04	6.2E-03	1.1E-04	5.4E-03	6.8E-04
12	120	2	95%	5%	95%	5%	25%	75%	25%	75%	2%	98%	48	60	60	0.10	1.90	0.03	1.40	0.48	1.4E-03	2.6E-02	3.9E-04	1.9E-02	6.5E-03
13	104	4	70%	30%	70%	30%	90%	10%	90%	10%	90%	10%	65	90	80	1.20	2.80	0.25	0.03	2.52	1.4E-02	3.3E-02	3.0E-03	3.3E-04	3.0E-02
14	60	2	60%	40%	60%	40%	40%	60%	40%	60%	5%	95%	32	70	70	0.80	1.20	0.04	0.68	0.48	5.5E-03	8.2E-03	2.5E-04	4.7E-03	3.3E-03
15	100	1	80%	20%	80%	20%	30%	70%	30%	70%	10%	90%	30	70 ?	70	0.20	0.80	0.06	0.50	0.24	2.3E-03	9.1E-03	6.4E-04	5.8E-03	2.7E-03
16	30	2	70%	30%	70%	30%	20%	80%	20%	80%	5%	95%	25	55 or more	55	0.60	1.40	0.06	1.06	0.28	2.1E-03	4.8E-03	1.9E-04	3.6E-03	9.6E-04
17	300	2	99%	1%	99%	1%	1%	99%	1%	99%	0%	100%	46	?	70	0.02	1.98	0.00	1.96	0.02	6.8E-04	6.8E-02	0.0E+00	6.7E-02	6.8E-04
18	36	4	30%	70%	30%	70%	18%	65%	22%	78%	0%	100%	14	NA	70	2.80	1.20	0.00	0.94	0.26	1.2E-02	4.9E-03	0.0E+00	3.9E-03	1.1E-03

Summary Statistics																									
Mean	72	2.6	71%	28%	71%	29%	26%	68%	28%	72%	15%	85%	39	75	69	0.84	1.72	0.16	1.06	0.50	4.80E-03	1.44E-02	1.03E-03	9.37E-03	3.97E-03
Min	20	1.0	10%	1%	10%	1%	1%	10%	1%	10%	0%	10%	14	60	55	0.0	0.4	0.0	0.0	0.0	4.57E-04	1.60E-03	0.00E+00	3.32E-04	1.60E-04
Max	300	4.0	99%	90%	99%	90%	90%	99%	90%	99%	90%	100%	65	100	80	3.6	3.2	0.9	2.6	2.5	1.44E-02	6.78E-02	6.68E-03	6.71E-02	2.99E-02
Stdev	65	1.0	25%	23%	24%	24%	20%	23%	20%	20%	24%	24%	14	15	8.0	0.9	0.8	0.3	0.7	0.6	4.59E-03	1.57E-02	1.72E-03	1.51E-02	6.76E-03
95th	147	4.0	96%	73%	96%	74%	56%	91%	56%	91%	56%	100%	20.8 (c)	100	80	2.92	3.20	0.62	2.34	1.14	1.43E-02	3.84E-02	3.54E-03	2.63E-02	1.07E-02

Notes:
NA = not available
a) Cells highlighted in pink are cases where the values on proportion of time spent in two location categories do not sum to 100% as expected. In these cases, the reported values were re-scaled to sum to 100% while maintaining the ratio of the values reported
b) Three respondents did not indicate an expected age at stop. An age of 70 was assumed in these cases.
c) 5th percentile value rather than 95th percentile

Appendix I-2

Exposure Questionnaire - OU1 Former Export Plant

Fishing Guides

Respondent	# Trips/year launched from Riverside Park	Minutes per launch or take out	Months typically conducting trips		Comments	# of months conducting fishing trips from Riverside Park	Start (age)	Stop (age)	Activity description for Riverside Park
			Start	End					
1	200	15	April	November	Heaviest June-September; does occasional trips in winter.	8	23	Lifelong	Back truck & trailer down ramp and unload or load boats.
2	100	20	June	October	NA	5	25	Lifelong	Back truck & trailer down and load or unload boat.
3 (a)	45	NA	NA	NA	Heaviest June-September; does occasional trips in winter.	8	NA	Lifelong	NA
4 (a)	45	NA	NA	NA	NA	8	NA	Lifelong	NA
5 (b)	100	NA	NA	NA	NA	5	NA	Lifelong	NA
6 (b)	100	NA	NA	NA	NA	5	NA	Lifelong	NA
7 (b)	100	NA	NA	NA	NA	5	NA	Lifelong	NA
8 (b)	100	NA	NA	NA	NA	5	NA	Lifelong	NA

(a) Respondent 1 indicated that two other guides working for the same company ran 45 trips per year, and that the activity was expected to be lifelong

(b) Respondent 2 indicated that four other guides working for the same company ran 100 trips per year, and that the activity was expected to be lifelong

NA = not available

Summary Statistics

Statistic	# Trips/year launched from Riverside Park	Minutes per launch or take out	# of months conducting fishing trips from Riverside Park	Start (age)
Mean	99	17.5	6.1	24.0
Min	45	15	5	23
Max	200	20	8	25
Stdev	47.9	3.5	1.6	1.4

Appendix I-3
Exposure Questionnaire - OU1 Former Export Plant
City Workers

Survey #	EF at OU1 (days/yr)	ET at OU1 (hr/day) (a)	Fraction of Time Outdoors (%)	Activity Outdoors	Start age	Stop age
1	261	2.12	100%	Mowing park area (1 hr/week); weed trimming field (8 hrs, 3x per year); plowing; spreading gravel (8 hrs/year); garbage removal (1hr/week).	NA	NA
2 (6 employees)	NA	NA	NA	Installing new sprinkler system in 2008; replacing water pipes that run from river to pavement in 2008; snow plows in winter; possibly adding bathrooms/expansion/move road.	NA	NA

NA = not available

(a) Calculated from description of activities